



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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CHICAGO, IL 60604-3590

FILE
COPY

REPLY TO THE ATTENTION OF

SR-6J

September 3, 1996

Mr. Alan P. Bielawski, Esq.
Sidley & Austin
One First National Plaza
Chicago, Illinois 60603

EPA Region 5 Records Ctr.



207080

**Re: Transmittal of Comments on FS Report: Revision 1
Lenz Oil Service Site
Lemont, Illinois**

Dear Mr. Bielawski:

U.S. Environmental Protection Agency (USEPA) and Illinois Environmental Protection Agency (IEPA) (the Agencies) are transmitting their review comments on the revised Feasibility Study (FS) report submitted for the Lenz Oil Service, Inc. (Lenz Oil) site in March 1995. The Agencies feel that a great deal of progress was made during the meeting of July 25, 1996 toward ensuring the development of a satisfactory FS report. The draft General Comments transmitted during that meeting and our discussion of those comments helped to clarify the best approach for developing the next revision of the FS report. Although the discussion during the July 25th meeting and subsequent telephone conversations have covered the majority of the issues that the Agencies would like the Lenz Oil Respondents to the RI/FS Consent Order to address in the next FS submittal, this letter and its attachments serve to: (1) provide specific instructions to assist in the revision of the report; (2) convey official Agency comments on the FS report submitted in March 1995; (3) provide brief summaries of some of the discussion during the July 25, 1996 meeting; and (4) transmit an ARAR summary table and an ARAR Fact Sheet concerning the Clean Air Act.

Enclosures included with this letter are:

- ▶ Attachment 1: Instructions for submittal of revised FS report
- ▶ Attachment 2: General Comments on FS report with summary of discussion/conclusions reached in meeting of July 25, 1996
- ▶ Attachment 3: Selected Specific Comments
- ▶ Attachment A: Table of ARARs to be incorporated into next FS revision
- ▶ Attachment B: ARARs Fact Sheet on Compliance with CAA

As was stated during the July 25th meeting, the two principal and overriding reasons why the Agencies considered the revised FS report to be inadequate were the lack of sufficient detail in the analyses of the alternatives and the unsatisfactory nature of the remedial alternatives that are considered. Two of four significant flaws in the first draft of the FS report, as delineated in the USEPA letter dated February 14, 1994, were not adequately addressed. The first of these flaws related to the lack of sufficient detail in the evaluation of alternatives. The analysis of the remedial alternatives available for cleaning up a site must be sufficiently refined to allow for an informed and supportable decision to be made regarding the most appropriate remedy. In addition, if some aspects of an alternative being analyzed cannot be completely defined without additional data, these data gaps should be clearly stated. The second major flaw in the report was described in the second general comment of the February 1994 letter, where it states that the FS report prematurely dismisses numerous treatment technologies for addressing the LNAPL and contaminated groundwater because the individual technologies, by themselves, would not address all of the contaminants found in the LNAPL and groundwater in the vicinity of the site. At hazardous waste sites such as this one, where a myriad of contaminants with widely differing physical and chemical characteristics are present, evaluating multiple treatment techniques in series is not only appropriate, but in most cases is essential.

In our meeting on July 25, 1996, it was determined that these two inadequacies perceived by the Agencies could in part be explained by the inadvertent omission in the FS report of information used, for example, to dismiss certain alternatives as viable, or the lack of adequate documentation of rationale or assumptions used in developing some of the components of the alternatives. The meeting also provided the Agencies with the opportunity to try to convey how the Lenz Oil Respondents could address these inadequacies in the next revision of the FS report. Based on the outcome of this meeting and on subsequent conversations with the Respondents, the Agencies are fully confident that the next FS submittal will provide all parties involved with a document on which a sound technical decision can be based regarding the best remedial alternative for the site.

According to §IX.C of the RI/FS Consent Order for the Lenz Oil site, reports that are disapproved must be resubmitted within thirty calendar days of receipt of the written notice of disapproval. In order to allow for adequate time so that a satisfactory FS report can be submitted to the Agencies, a modified schedule has been agreed to. As documented in the USEPA letter of August 6, 1996, the next revision of the FS report will be due on October 16, 1996. This date may be modified if issues related to how RCRA and/or TSCA regulations may impact the evaluation of alternatives cannot be resolved in a timely manner. Please be advised that in the event that the second revision of the FS report is less than adequate, USEPA may elect to undertake the RI/FS and recover costs from responsible parties at a later date.

Please feel free to call Stuart Hersh, at (312) 886-6235, or me, at (312) 886-4785, if you have any

September 3, 1996

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questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "Mary Tierney".

Mary Tierney
Remedial Project Manager

cc: John Imse, ERM-North Central, Inc.
Diane Richardson, Commonwealth Edison
John Griggs, Commonwealth Edison
Jerry Willman, IEPA
Susan Horn, IAG
Peter Orlinski, IEPA
Dick McAvoy, BVSPC
Stuart Hersh, USEPA
Bill Bolen, USEPA

ATTACHMENT 1
INSTRUCTIONS FOR SUBMITTAL OF FS REPORT: REVISION 2
LENZ OIL SERVICE SITE

1. The revised FS report shall be submitted according to the schedule specified in the USEPA letter dated August 6, 1996.
2. ERM-North Central should use their professional judgement regarding which tables and figures should be resubmitted along with the next revision of the FS report.
3. *Appendices need only be submitted along with the next revision of the FS report if substantial changes were requested.*
4. In the next revision of the FS report, a summary of state and federal ARARs should be included as an appendix to the report. Attachment A to the comments contains additional ARARs to include along with those that are listed in Tables 2-1, 2-5, and 2-19. These additional ARARs should be included in the next revision of the FS report unless it is documented that they would not apply to any of the potential remedial alternatives being considered for the Lenz Oil site.
5. The General Comments in Attachment 2 are "big picture" comments that address the significant problems and inadequacies in the revised FS report and provide guidance on what substantive issues need to be addressed in the next revision of the report. In general, specific sections of the revised FS report are not referred to in the General Comments. Responding to these General Comments should be the chief objective in the next revision of the FS report.
6. The Specific Comments listed in Attachment 3 are comments on the contents of specific sections, tables, figures, or appendices that were included in the revised FS report. Attachment 3 contains only those specific comments that are important in the next revision of the FS; the majority of the comments have been deleted and may be included as part of the Administrative Record for the site for documentation purposes only. The Specific Comments can be classified into three categories: (1) those that will require either a substantial modification to the report or a satisfactory response if no modifications are made; (2) those that are included "for the record", but may not be relevant when the next revision of the FS report is written; these comments are "unmarked" and should be addressed only if they are deemed to be relevant in the context of addressing the General Comments; and (3) those that point out discrepancies and inconsistencies in the revised FS report which should be addressed by a QA/QC review of the data and information in the report; these comments are indicated by an arrow, "➡". Attachment 3 includes comments from categories (1) and (3) only.
7. Inconsistencies in the data presented in the revised FS report are pointed out in numerous comments in Attachment 3. In noting these discrepancies, the reviewer assumed that the data included in the figures were accurate and any deviations from the values in the figures were inaccurate. This may not be a valid assumption. The valid source for data results should be determined, and all data included in the report should be verified against these correct data.

ATTACHMENT 2¹
GENERAL COMMENTS ON LENZ OIL FS REPORT: REVISION 1
LENZ OIL SERVICE SITE

1. Two of the four major flaws pointed out by USEPA in its February 14, 1994 comment letter were not addressed. The two major flaws which were not addressed are described further in comments 2 and 3.3 below.
2. As stated in the USEPA comment letter of February 1994, an FS report is an engineering document. It is not an Alternatives Array document. The intended purpose of an FS report is to examine possible remedial alternatives for a site in sufficient detail so that a technically sound conclusion can be arrived at regarding the most appropriate clean-up approach for a site. If the analysis of remedial alternatives presented in an FS report does not provide sufficient information so that a decision regarding remedy choice can be made, the report has not served its purpose. In general, the revised FS document submitted by the Respondents falls short in terms of sound technical evaluation of alternatives, with some specific examples of this being the lack of calculations presented, the lack of technical evaluation of modeling results and of the remedial alternatives in general, the lack of identification of relevant engineering issues, and the formation of some conclusions on a non-technical basis. The revised FS report as submitted relies frequently on unsupported generalizations in order to come to conclusions regarding the appropriateness, viability, effectiveness, cost-effectiveness, and implementability of various remedial alternatives. Appendix E, which describes results from the ARMOS' model examination of groundwater extraction systems, contaminant transport, and LNAPL recovery, more closely approximates the level of technical detail that should be contained throughout an FS report.
3. The chief questions facing us in the consideration of what the appropriate remedy is for the Lenz Oil site are: (1) what is the most appropriate way to address the residual soil contamination at the site?; (2) what is the best method for removing the LNAPL from the subsurface of the site?; (3) what treatment technologies would be effective for treating the types of contaminants in ground water below and in the vicinity of the site?; (4) what type

¹ These general comments were prepared prior to the meeting held between the Agencies, the Lenz Oil Respondents, and their consultants from ERM-North Central on July 25, 1996. Comments 1 through 3.5 were discussed at length during the meeting to attempt to clarify what would need to be included in the next revision of the FS report. Italicized notes that follow the remainder of the comments briefly summarize the discussion during the July 25, 1996 meeting and indicate any resolution(s) that were reached regarding the comment during the meeting.

of groundwater extraction system would be appropriate for the site?; and (5) what additional technical questions will need to be answered at the predesign stage to ensure that the appropriate remedy for the site is selected and implemented and how will these questions be addressed (e.g., treatability studies)? Brief discussions on the adequacy of the revised FS report in regards to each of these questions appear below.

3.1 Question #1: Residual Soil Contamination

A number of options related to question #1 were explored in the revised FS report. Among the remedial technologies that were considered for addressing remaining soil contamination at the site, the remedial alternatives that were retained included: (1) three different types of soil caps; (2) *in situ* stabilization; (3) excavation, on-site treatment using thermal desorption, and on-site backfilling; (4) *in situ* stabilization, excavation, on-site treatment using thermal desorption, and on-site backfilling; (5) excavation, on-site treatment using thermal desorption, and off-site landfilling of residuals; (6) excavation and off-site incineration; and (7) excavation and off-site landfilling. Technical analysis of the treatment options of thermal desorption and solidification/stabilization (S/S) was minimal. Criteria for ascertaining whether the particular technology would be suitable for the site were not presented or evaluated. An example of potential criteria to consider in evaluating S/S as a suitable technology would be soil moisture content, particle size, humic content, or porosity conditions. Are conditions at the site favorable for stabilization? What is the effect of the presence of oil and grease on effectiveness of this technology? Was the need for treatment of off-gas considered with stabilization?

On page 2-29 in the revised FS report, the conclusion is reached that S/S would not be a suitable technology for the site, yet S/S appears in four of the remedial alternatives presented. Please explain.

3.2 Question #2: Recovery of LNAPL

Regarding question #2, the two remedial options presented for recovering LNAPL at the site were: (1) active recovery using trenches and (2) active recovery using extraction wells. No alternatives for enhanced recovery of the LNAPL were retained.

Enhanced recovery of LNAPL, via injection of cosolvents or surfactants or addition of heat or steam, was raised as a possibility on page 2-30 and briefly discussed on pages 2-41 and 2-42 in the discussion of modeling results. Both methods of enhanced recovery that were introduced were dismissed as viable options on page 2-44. Page 2-41 states that based on modeling results, use of surfactant flushing or heating would increase LNAPL recovery by 17%. On page 2-44, surfactant flushing is dismissed as an option because its “effectiveness is not yet well understood”. On this same page, enhanced recovery via heating is dismissed because “the LNAPL at the Lenz Oil site is very viscous” and heating “would only slightly increase the volume...recovered and slightly decrease the [recovery] time”. Given that displacement technologies have been widely used in industry for secondary oil recovery, it is surprising that no applicable enhanced recovery technologies

were found that would be suitable to retain as a potential remedial alternative for the Lenz Oil site.

It is assumed that an appropriate value for the viscosity of the LNAPL was used in running the LNAPL recovery model. Therefore, the reference to the LNAPL being “very viscous” as a reason why heating was dismissed as a remedial option would not seem to be relevant. Regarding the statement that the volume recovered and recovery time were only “slightly” improved, without additional information and without examining the costs of the alternative, it is difficult to conclude that the technique should be dismissed as an option.

The revised FS report goes on to say, on pages 2-44, 2-45, and 2-46, that because it would be hard to predict the ability of an injected surfactant to permeate site soils, “this recovery option is not implementable”. Not being able to precisely predict degree of surfactant penetration does not serve as a reason to conclude that the option is not implementable. Moreover, and to reemphasize, this is an FS report; scientific approaches are available and scientific approaches should be used to arrive at a better analysis of the potential effectiveness of the technology, rather than just saying that “it is not known whether the surfactant would reach and remove all of the LNAPL”. Why was five-foot spacing of the injection wells chosen in the first place? What was the technical basis for this spacing? What type of enhanced removal rate would be obtained if the radius of influence of the injection wells were only 1.0 feet instead of the desired 2.5 feet? This technology was developed to specifically address removal of non-aqueous fluids from subsurfaces. Under what porosity and permeability conditions has the technique proven to be effective? The hydraulic conductivity at the Lenz Oil site is relatively high, e.g., $1.0\text{E-}02$ cm/sec. Does this relatively high hydraulic conductivity increase the chances that the technology would be successful? Could injection wells be located in the areas most highly-saturated with LNAPL such that the enhanced recovery which does occur is optimized? Would the use of a particular surfactant or cosolvent offer advantages over others? At what pressure was it assumed the surfactant would be injected? By how much could that pressure be increased? Were any calculations run regarding this option?

Page 2-45 states that an “additional problem with both surfactant flushing and hot air injection is the possibility of contaminants becoming more amenable to dissolution in the ground water” and that the “ground water treatment system would have to be sized so as to handle the increased load of contaminants”. What was the basis of the first statement? Were technical calculations performed to evaluate this “possibility”? Why is sizing the groundwater treatment system to handle the dissolved contaminants considered to be a problem? The revised FS report states that heating or surfactant injection would increase the recoverability of the LNAPL by 17% according to the model; by how much would this number increase if additional “recoverability” was achieved via driving contaminants into adjacent ground water, which could then be extracted and treated? If it is agreed that the objective of remediating the site is to remove the contaminants from the site, does the possibility of dissolution serve or detract from this ultimate purpose? How much of an

“increased load” of contaminants being driven into ground water is predicted? Is the concern that the groundwater treatment system would not be able to handle the increased concentrations of contaminants in the ground water, or is the concern that the volume of contaminated ground water which will have to be treated will increase significantly? By how much would groundwater treatment costs increase if surfactants or heating were used to enhance the recovery of LNAPL? Provide additional analysis and description of how use of enhanced LNAPL recovery techniques would affect length of time for groundwater remediation.

3.3 Question #3: Groundwater Treatment Technologies

Of the eight “action” alternatives that are presented in the revised FS report, four have “natural attenuation” for the groundwater component of the alternative. The remaining four alternatives present the same method for addressing groundwater contamination--filtration followed by carbon absorption.

As in the first FS report, numerous groundwater treatment technologies were presented and immediately dismissed due to their not being able to treat all contaminants present in ground water. This was the second significant flaw pointed out in the USEPA comments of February 1994 which was not adequately addressed in the revised FS report. The February 1994 comment stated that the FS report took the approach that “instead of evaluating multiple treatment techniques in series, the multiple waste type alone is reason enough to eliminate each technology when evaluated alone”. In the next revision of the FS report, appropriate groundwater treatment trains and their effectiveness in addressing site groundwater contaminants should be evaluated. Relevant journal articles and studies and current literature should be researched, and all sources used as references for evaluating whether the technology should be retained or eliminated should be cited. Those technologies which appear to be viable alternatives should be costed out. If a treatment technology(ies) is not well documented but appears to be potentially applicable, treatability studies necessary to evaluate the suitability of the methodology should be described.

What scientific literature or data were relied on in concluding that filtration will successfully treat the levels of lead found in the ground water? What scientific literature or data were relied on to conclude that carbon absorption would be capable of treating the levels and types of organic contaminants found in ground water which, in addition to the more typical VOCs such as TCE, also contain a variety of PAHs, metals, and PCBs? What are the results of calculations of the contaminant loading to the carbon, frequency of carbon regeneration/replacement that would be necessary, and achievable removal rates?

3.4 Question #4: Groundwater Extraction System

According Section 3.2.6.1, results from the analysis of several groundwater extraction schemes using the ARMOS model showed that extraction trenches would be the best method for removing ground water. Appendix E describes the results of the model but

provides no information to support the design of the recommended trenches. Costs are estimated for an extraction system composed of one trench and one line of extraction wells. No information is provided to support the design of this system either. A description of what factors led to the model “selecting” extraction trenches as the optimal method should be provided within the text of the report. Support for the design of the proposed extraction systems should be provided. As just one example, one question that needs to be answered is what the technical basis was for determining that the appropriate depth of the extraction trenches was five feet below the water table.

3.5 Question #5: Identification of Additional Technical Issues

Little technical analysis and discussion are provided in the revised FS report regarding possible treatability studies that may have to be performed prior to initiating remedial design, pilot or bench-scale studies which could be completed to shed light on the effectiveness and implementability of certain options that the report dismisses due to a technology “not being well understood”, the need for performing aquifer pumping tests that may be necessary to reliably determine the effect of the Des Plaines River on groundwater extraction proposals, or whether groundwater treatment tests should be run to determine whether treatment via filtration followed by carbon absorption will be sufficient to adequately treat the high levels and wide variety of contaminants in site ground water. In the next revision of the FS report, the need for bench-scale tests, pilot tests, or treatability studies should be considered, and if any are recommended, descriptions of the recommended tests, minimum volumes to be tested, testing protocols, QA/QC measures, data reliability, etc., should be provided.

LNAPL

4. Based on TCLP test results of the LNAPL at the site and on the fact that RCRA-listed waste was disposed of at the site, the LNAPL at the site is, and should always be considered to be, a RCRA hazardous waste. Soil shall be considered RCRA hazardous if it is contaminated with LNAPL at levels which exceed acceptable human health risk levels. Ground water shall be considered a RCRA hazardous waste, if contaminants are present in the ground water at levels that exceed acceptable human health risk levels. The next revision of the FS should be modified accordingly.

Note: Further clarification of RCRA-listed nature of the LNAPL and LNAPL-contaminated media and how remedial alternatives may be affected will be provided by the Agencies.

Ground Water

5. Although it may be generally true that overall regional groundwater flow is to the south and southwest, water table elevations shown in Figures 1-14 through 1-32 indicate that ground water may flow radially from the site at some locations. The potential for this

more complex model for groundwater flow direction in the area of the site should be kept in mind when discussing remedial alternatives.

Note: As discussed during the meeting on July 25, 1996, the Agencies do agree that, overall, groundwater flow direction is primarily to the south and southwest. The Agencies wanted to make this point, however, in case it might have a potential impact on the design of groundwater extraction systems for the site in the future.

6. Locations of additional monitoring wells that may need to be installed in order to define the southwest, south, and southeast edges of the groundwater contamination plume should be included in the Technical Implementability discussion for the first alternative that includes groundwater treatment as a remedial component. Subsequent discussions of remedial alternatives with a groundwater treatment component may reference this initial discussion.

Note: ERM-North Central pointed out that monitoring well locations had been indicated in several figures included in the FS report. Discussion about these monitoring wells will be included in the next revision of the FS.

7. Natural attenuation is included as the groundwater remedial component in four of the eight "action" alternatives presented in the revised FS report. A paragraph on page 2-27 provides a brief description of how this term is being used in the report. Page 2-27 states that natural attenuation consists of "allowing natural reactions that occur within an aquifer (such as sorption, precipitation, volatilization, and biodegradation) to reduce the concentrations of chemicals of concern to acceptable levels". Dilution is not mentioned as being one of the mechanisms of natural attenuation. The "evidence" that is provided in the revised FS report to show that natural attenuation is occurring at the Lenz Oil site is summed up by a statement referring to "the significantly lower concentrations and number of parameters found in wells near the river".

In short, the revised FS report does not adequately define what is meant by natural attenuation, nor does it provide technical discussion, data, information from scientific literature, modeling results, or any other support to document that "natural attenuation" is indeed occurring. Unless it can be shown otherwise, it must be assumed that natural attenuation will not meet several important criteria for groundwater remediation such as restoration of the aquifer to its beneficial uses in a reasonable time frame and preference for treatment that permanently and significantly reduces the mobility, toxicity, or volume of hazardous substances as a principal element.

Considering that natural attenuation is included as the groundwater component in four of the alternatives presented, some technical analysis or at least a semi-technical discussion should be provided to attempt, based on soil and site conditions, data such as BOD and TOC, precipitation data, amount of dilution, river recharge/discharge patterns, K_{oc} values, biodegradability data, etc., to evaluate what types of mechanisms would be accounting for any "natural attenuation" that might be occurring. Also, please note that natural

attenuation is typically not a preferred alternative when levels of contaminants in ground water are such that the risks posed are significantly greater than the NCP risk range of $10E-04$ to $10E-06$ increased carcinogenic risk. Excess carcinogenic risks posed by shallow ground water at the Lenz Oil site are on the order of magnitude of $10E-02$.

Note: Natural attenuation as a potential alternative to address groundwater at the site was discussed during the July 25, 1996 meeting. If ERM-North Central chooses to include natural attenuation as a remedial alternative in the next revision of the FS report, more support for the assertion that it is occurring at the site and reasons why it would be a viable alternative will be included in the report.

8. Comment omitted.

9. What are the advantages and disadvantages of extraction wells vs. interceptor trenches for recovery of LNAPL? Calculate and compare rate of VOC emissions to the atmosphere for each of the systems.

Note: More in depth analysis of extraction wells vs. interceptor trenches for recovery of LNAPL will be provided in the next revision of the FS report.

10. Why were the pumping rates of 14 gpm used in running the ARMOS model, yet a pumping rate of 2 gpm is used to calculate time for groundwater remediation? Given the high hydraulic conductivity ($10E-02$ cm/sec) of the subsurface near the site, it appears that it is the concern about drawing too much water from the Des Plaines River that led to selection of such a low aquifer pumping rate. If this is the primary reason for limiting the groundwater extraction rate, the possibility of constructing a slurry wall in between the extraction system and the river should be technically evaluated. If this is feasible, pumping rates could be increased and groundwater clean-up time could dramatically improve.

Note: Further information regarding selection of pumping rates will be provided in the next revision of the FS.

11. A complete description of the assumptions on which the groundwater extraction system is based should be provided. The system as described was developed to remediate the "shallow portion" of the aquifer. What is meant by the "shallow portion" of the aquifer needs to be explicitly defined. It is not clear to what depth remediation of ground water is being proposed. Remediation of the "deeper portion" of the aquifer is not presented as an option. It is assumed that this option was not mentioned or evaluated due to the anticipated high cost of this alternative. This alternative should be evaluated and costed out so that its appropriateness can be objectively evaluated.

Note: Development of the groundwater extraction system will be described in the next revision of the FS report. What is meant by the "shallow portion" of the aquifer will be described. Reasons for why remediation of the "deeper portion" of the aquifer is unnecessary will be described.

12. Provide a technical analysis of the amount of “smearing” of LNAPL due to drawdown from extraction wells based on compound specific parameters such as K_{ow} , soil specific parameters, and hydrogeology, and determine whether there is an optimal pumping rate for extraction of the LNAPL which would minimize the smearing effect. Also, analyze how a pulsed pumping approach to extraction of LNAPL and ground water would affect extraction times, recoverable amounts, and minimization of smearing. Determine the optimal pumping cycle for this approach.

Note: Pumping rates will be optimized during remedial design.

13. Groundwater extraction analysis using the ARMOS model should be run using the same parameters as included in runs A through G, except that it should be assumed that no soil cap will be constructed on the site. Incorporate information on bedrock fracture analysis data wherever appropriate (see Appendix E of RI report).

Note: Assumptions used in the ARMOS and MODFLOW models will be checked.

14. As indicated in General Comment 3.3, calculations showing how much carbon would be required to treat ground water that is heavily contaminated with VOCs, oil, and PCBs should be included in the revised FS report. Furthermore, carbon that has been in contact with listed wastes will be considered as a listed waste until it is regenerated. What are the plans for regeneration of the carbon at a permitted facility? Where are the calculations and assumptions for determining cost of regeneration?

Note: This comment will be addressed in the revised FS report.

15. What kind of filtration unit is being proposed to remove lead from ground water?

Note: This comment will be addressed in the revised FS report.

16. Contaminants of concern in ground water would have to be treated to levels so that the ground water no longer poses unacceptable risks. If contaminants in ground water are not treated to acceptable health-based levels, the ground water would be considered a listed RCRA waste and would have to be treated and disposed of accordingly. Prior to treatment, ground water will be considered to be a RCRA waste, which means that storage vessels for storing ground water prior to treatment will have to meet RCRA standards for storage vessels and secondary containment requirements will need to be met.

Note: Refer to USEPA letter dated September 3, 1996 for clarification of this issue.

17. Details regarding the possibility of discharging ground water to a local POTW, including location of POTW, frequency of sampling required, pretreatment requirements, capacity of POTW, need to be expounded upon.

Note: This comment will be addressed during remedial design.

18. MCLs should be considered as potential ARARs for remediation of ground water at the site. Include a table showing MCL exceedences in ground water in the next revision of the FS report.

Note: It was noted that, for the most part, State standards are as or more stringent than MCLs; however, MCLs will be included in tables showing groundwater data.

Soil

19. Comment omitted.

20. Comment omitted.

21. If on- or off-site incineration of LNAPL and/or soil is going to be seriously considered as an alternative, a more detailed cost comparison between constructing and operating an on-site incinerator and shipping the wastes off-site to be incinerated must be provided.

Note: It was determined during the meeting on July 25, 1996 that on-site incineration would not be seriously considered as a remedial alternative for the Lenz Oil site due to community concerns that would most likely arise.

22. The fact that a portion of the site is located in a 100-year flood plain must be addressed when discussing each alternative. Since it appears that the location of any proposed landfill unit would be in the 100-year floodplain, the location standards of 35 Illinois Administrative Code, Section 703.184, as well as Section 724.118 regulations, would have to be addressed. Section 703.184 requires owners and operators of facilities located in the 100-year floodplain to provide: (1) an engineering analysis to indicate the various hydrodynamic and hydrostatic forces expected to result at the site as a consequence of a 100-year flood; and (2) structural or other engineering studies showing the design of flood protection devices and how these will prevent washout. It may be prudent to arrange for the area to be resurveyed to confirm its designation as a 100-year floodplain.

Note: The issues raised in this comment will be addressed in the revised FS report.

Risk Analysis

23. Regarding the repeated mention of the comments prepared by ERM-North Central on the Baseline Risk Assessment for the site, the FS report is not an appropriate place to include references to these comments. In addition, as has been discussed previously, incorporation of the modified assumptions recommended by these comments would not significantly alter the conclusions of the Baseline Risk Assessment. That is to say, incorporation of the modified assumptions would not result in risks originally estimated to fall within the 10E-04 to 10E-06 range specified in the NCP to experience a decrease such that total risk becomes less than 10E-06. Unless something in the ERM-North Central comments were overlooked, the primary assertion of the comments appeared to be that the rate of volatilization of VOCs from subsurface soil was overestimated in the Baseline Risk Assessment. However, as shown in the Baseline Risk Assessment, the contribution

to the overall risk of inhaling VOCs from site soil in most cases does not "drive" the risk numbers. Using the modified assumptions as suggested would presumably result in an even less significant contribution to overall risk from this particular pathway. Therefore, for the most part, these comments would not be of consequence.

Note: ERM-North Central pointed out that for several soil samples, risk due to inhalation of VOCs from subsurface soil did contribute significantly to the risk. The Agencies will review the risk analysis for these samples. Regarding the inclusion of the reference to the comments submitted by ERM-North Central about the Baseline Risk Assessment, in the next revision of the FS report these comments will be described once in the initial section of the report.

24. A large number of the risk calculations presented in the revised FS report for risk posed by individual surface and subsurface soil samples could not be duplicated by USEPA. An attachment to the specific comments shows some of the results of risk calculations obtained by USEPA in the process of trying to verify the numbers presented in Appendix B, "Risk Calculation Procedures for Individual Soil and Ground Water Samples", of the revised FS report. The appendix in the revised FS report does not clearly describe what procedures were used to obtain the numbers. The general equation from the Baseline Risk Assessment that was used is referenced in the appendix; however, it is not indicated whether the assumed receptors were adults, teenagers, or children.

In all cases, USEPA recalculations of risks posed by individual soil samples showed lower risks than those recalculated risks presented in Appendix B of the revised FS report. The Baseline Risk Assessment calculated risks posed by site soil based on contaminant concentrations representing either the 95% upper confidence limit (UCL) or the maximum detected concentration, whichever was lower. Given the use of this high confidence level or a maximum concentration in the calculations in the Baseline Risk Assessment, it is difficult to explain the large number of individual soil samples that show unacceptable risks as presented in the revised FS report. No discrepancies were found in the risks calculated for individual ground water samples.

Note: Some additional explanation of how these risk calculations were done will be included in the next revision of the FS report. Discrepancies between USEPA risk calculations and ERM risk calculations were cleared up in a phone call following the July 25, 1996 meeting. USEPA risk numbers were lower than ERM's because ERM added the risk to adults to the risk to children. USEPA risk numbers were for adults only

25. Related to the former comment, it is not standard practice to prepare a Baseline Risk Assessment for a site, come to conclusions regarding the risks posed by site media, and then, in the FS report, to redo these calculations for individual samples.

Note: Although it is not standard practice to redo risk calculations at the FS stage, it provides an acceptable way to determine areas of soil that exceed a certain risk range and that need to be remediated.

Other

26. Show calculations for how all ground water and soil volumes to be addressed were obtained. Include flow diagrams for remedial processes, figures showing areas to be excavated and areas to be backfilled, locations of extraction wells and extraction trenches, etc., as appropriate.

Note: During the July 25, 1996 meeting, ERM pointed out the locations in the FS report where this information is provided. It is anticipated that by reducing the number of tables and figures in the next FS submittal, this relevant information will be more accessible.

27. Discrepancies in the data presented in tables and figures in the revised FS report were noted. A thorough QA/QC check of the data included in tables and figures submitted with the next report revision should be conducted.

Note: Comments included in Attachment 3 provide specific instances where discrepancies were observed. Omitting some of the figures and tables in the revised FS report will eliminate the need for a QA/QC check in some cases. In general, though, any QA/QC that is done should focus on correcting those instances where reported concentrations of a TCL compound or TAL analyte differ significantly in figures and/or tables.

28. The remedial action objectives listed in Table 2-6 need to be discussed.

Note: ERM-North Central will propose revised remedial action objectives.

29. For each remedial alternative presented in the next revision of the FS report, Section 3 should include a brief discussion regarding whether delisting would have to be considered in order to implement the remedy, how this might affect the remedial alternative, and how the Corrective Action Management Unit (CAMU) concepts with regard to RCRA might complicate or affect implementation of the remedial alternative. (CAMU regulations were adopted in State regulations in 1995 (Subpart S of Section 724)).

Note: The Agencies will provide clarification regarding how RCRA requirements should be incorporated into the remedial alternatives that will be evaluated in the next revision of the FS report.

ATTACHMENT 3¹
USEPA Specific Comments on Feasibility Study Report, Revision 1
Lenz Oil Service, Inc. Site
Lemont, Illinois

Specific Comments--Section 1.0

* Comment 4². Section 1.2.1, page 1-3, Figure 1-5. Provide a clearer copy of the figure for wetlands identification. Include discussion of areas on and near the site that are designated as wetlands.

* Comment 7. Section 1.2.2, paragraph 3, page 1-5. There is one residence southwest of the Lenz Oil site that was not hooked up to the municipal water supply in 1988. The well at this location was not plugged and abandoned in 1988. The resident has stated that the well is not used as a source of drinking water. Please modify the text accordingly.

* Comment 11. Section 1.3, page 1-11. The purpose of discussions regarding the 1986 and 1987 IEPA Record of Decisions (RODs) is unclear. Other portions of this section appropriately explain the removal actions that were completed by the IEPA. All of the text regarding the RODs should be removed starting with the second complete paragraph on page 1-11 and ending with second complete paragraph on page 1-12.

* Comment 12. Section 1.3, page 1-13, third bullet. All residents except for one were provided municipal water. Modify text to reflect this.

* Comment 13. Section 1.3, page 1-13, last paragraph. This discussion is not relevant to an FS. The paragraph should be deleted. (See also comment on Section 1.3, page 1-11).

* Comment 14. Section 1.3, page 1-14, first paragraph. The Feasibility Study report is a technical document; discussions regarding legal issues and responsibilities should be addressed elsewhere. The last two sentences of this paragraph should be deleted.

¹ A number of comments were deleted from the original list of specific comments. Remaining comments were not renumbered.

² An asterisk indicates the comment is about the content of the submittal; an arrow indicates the comment relates to discrepancies in data reported in the submittal.

* Comment 15. Section 1.3, pages 1-7 through 1-15 (USEPA Comment 3, 2/14/94, FS Revision 0). Discussions that summarize and establish the "nature of the RCRA listed materials" need to be included at some point in the "Site History" section.

* Comment 22. Section 1.4.3., pages 1-19 through 1-22. Please provide conductivity values in units of cm/sec also.

* Comment 25. Section 1.4.3, page 1-20, third complete paragraph. It should be made clear that the information from the telephone conversation with Keros Cartwright was not based on calculations of infiltration rates using field data and specific input parameters and that any site infiltration estimates based on this source of information may not be accurate.

* Comment 28. Section 1.4.3, paragraph 5, 2nd sentence, page 1-20. Figure 1-14 shows a southwest component to the groundwater flow in the area southeast of Jeans Road; however, this is not described in the text. Include this in discussion.

* Comment 35. Section 1.5.1.1, pages 1-25 and 1-26. References within this section regarding the IEPA's removal action in 1987 misrepresent the degree to which the clean-up was performed. The text within the IEPA Record of Decision Addendum to the January 17, 1986 ROD states that "[a]ll soils and sludges, after incineration, shall contain no more than 5 ppm cumulative of PCBs and organic priority pollutants (hereafter sometimes referred to as the "clean-up objective") in order to be deemed incinerated". The term "clean-up objective" as used above and throughout the remainder of the ROD Addendum was used as a measure of incinerator performance. The term was not meant to represent an "action level" as it is currently used in the context of removal actions to refer to contaminant levels which dictate the extent of the area to be acted upon. In the context of the 1988 removal action, then, the "clean-up objective" was used to evaluate whether incineration had reached completion. The extent of the area to be "acted upon", that is, the area of soil to be excavated and incinerated, was limited to the area formerly occupied by eight underground tanks and three above-ground tanks that had been determined to be leaking.

The revised FS report should be modified accordingly to convey the original intent of the 5 ppm contaminant level objective as a performance indicator for the incinerator rather than as a level prescribing whether action was or was not necessary.

➡ Comment 37³. Section 1.5.1.2, paragraph 1, page 1-27. The paragraph is in the deep soil section and references shallow soil boring figures (i.e., Figures 1-36 and 1-42). Clarify.

➡ Comment 39. Section 1.5.1.2, paragraph 3, line 2, page 1-27. Aldrin and Aroclor-1254 were detected in samples listed in Table 1-9, under the Deep-Area A column, not in Table 1-14. Clarify.

* Comment 44. Section 1.5.2.1, paragraph 5, page 1-31. Replace second sentence with the following: "The types of SVOCs on the south bank were similar to those on the north bank; concentrations of the SVOCs detected were higher on the south bank."

* Comment 47. Section 1.5.3.2 page 1-36, and Section 1.5.3.3, page 1-37 (USEPA Comment 4, 2/14/94, FS Revision 0). The "Physical Characteristics" section and the "Chemical Characteristics" section should contain discussions about the LNAPL being a RCRA characteristic waste and a RCRA listed waste.

* Comment 49. Section 1.5.3.3, paragraph 2, page 1-37. Add "acenaphthalene" to the first sentence.

* Comment 50. Section 1.5.3.3, page 1-37. The stated lowest total VOC concentration provided on this page does not match that provided on page 20 of Technical Memorandum No. 4. Please check.

* Comment 51. Section 1.5.4, page 1-38. To avoid confusion, this section should explain and identify groundwater areas A and B as explained and identified within the risk assessment in Section 2.4.3, page 23:

- ° Groundwater Area A -- Based on groundwater samples taken on site and within the groundwater contamination plume
- ° Groundwater Area B -- Based on groundwater samples taken off site and within the groundwater plume.

All figures, tables, and text should be revised to reflect this point.

➡ Comment 52. Section 1.5.4, page 1-39. Tables 1-30 and 1-31 are missing beryllium.

➡ Comment 53. Section 1.5.4.1, paragraph 5, line 8, page 1-39. The sentence that states "...detected as dissolved inorganic analytes (Figures 1-48 and 1-49)." is unclear. Figures 1-48 and 1-49 list SVOCs and pesticides/PCBs, respectively. Revise.

³ Comments marked with arrows do not need to be responded to individually, but are included to show where discrepancies were noted. Data in tables and figures included in the next FS submittal will be reviewed for consistency.

➡ Comment 54. Section 1.5.4.2, paragraph 5, line 3, page 1-40. It is indicated that Figure 1-52 contains data on metal concentrations in groundwater. This figure contains surface water and sediment data. Please correct.

➡ Comment 55. Section 1.5.4.2, paragraph 6, line 5, page 1-40. The sentence states Figure 1-53 contains background well inorganic data. Figure 1-53 contains data on VOC and SVOC concentrations in surface water and sediment samples. Correct.

* Comment 58. Section 1.7, page 1-44. Discussion regarding the Respondents' comments on risk assessment should be removed. The USEPA and IEPA have taken such comments into consideration.

Specific Comments--Section 2.0

* Comment 67. Section 2.0. Attachment A lists additional ARARs which should be consolidated with those in Tables 2-1, 2-5, and 2-19.

* Comment 68. Section 2.1.1.1, page 2-3. At the top of the page, add an additional bullet item to the list of chemical-specific ARARs which says: "Site-specific remediation goals established by USEPA".

* Comment 69. Section 2.1.1.1, Safe Drinking Water Act Standards, page 2-4. As stated in USEPA's *CERCLA Compliance with Other Laws Manual* (EPA/540/G-89/006), Section 4.2.1, page 4-8: "...MCLs are relevant and appropriate as *in situ* cleanup standards where either surface water or groundwater is or may be used for drinking water. When no promulgated standard exists for a given contaminant, proposed MCLs are to be given greater consideration among the to-be-considered advisories." Therefore, MCLs should be included as relevant and appropriate for the Lenz Oil site.

* Comment 70. Section 2.1.1.1, Federal Water Quality Criteria, page 2-4. References to "Federal Water Quality Criteria" should be changed to "Ambient Water Quality Criteria (AWQC)" under the Clean Water Act. Delete the last sentence of page 2-4. The appropriate contaminant concentrations in treated groundwater discharged to a surface water body would be established by either USEPA or IEPA.

* Comment 72. Section 2.1.1.1, Resource Conservation and Recovery Act Requirements, paragraph 3, line 1, page 2-5. Include the results for the LNAPL samples found to exceed the TC standards. State which standards were exceeded.

* Comment 73. Section 2.1.1.1, Resource Conservation and Recovery Act Requirements, paragraph 3, line 9, page 2-5. Following the statement "only the parameters for which the

waste was listed", insert the following: "(i.e. the underlying hazardous constituents as defined by 40 CFR 268.2(i))".

* Comment 74. Section 2.1.1.1, Resource Conservation and Recovery Act Requirements, paragraph 3, lines 11, 12, and 13, page 2-5. Delete the statement "the USEPA's 'A Guide to Delisting of RCRA Wastes for Superfund Remedial Responses' (USEPA, 1990b)," and replace with the following: "40 CFR 271.9 and 35 Illinois Administrative Code 720.122."

* Comment 75. Section 2.1.1.1, page 2-6, "To Be Considered". As requested in several previous comments, please remove the discussion regarding ERM comments on the Baseline Risk Assessment.

In 35 IAC Part 620, Subpart F, it is stated that "This subpart establishes...guidance levels that, in the absence of standards under Section 620.410, must be considered by the Agency in: a) Establishing groundwater cleanup or action levels whenever there is a release or substantial threat of a release...". These guidance levels, also known as Illinois Groundwater Objectives, must be addressed as a chemical-specific ARAR at the Lenz Oil site in all cases where groundwater standards are not available.

* Comment 76. Section 2.1.1.1, page 2-6. For any remedy that involves an *ex situ* type of VOC removal resulting in VOC emissions, a potential ARAR would be the Clean Air Act. Attachment B contains a copy of the fact sheet "Compliance with the Clean Air Act and Associated Air Quality Requirements". Mention of this as a "TBC" requirement should be included in this section.

* Comment 84. Section 2.3.1.3, page 2-12. Text should provide the source of the equation used to estimate PCB soil concentrations, indicate why the equation is appropriate in this situation, indicate the general validity of the assumptions and parameter values used, indicate how conservative or non-conservative the equation and assumptions are, and describe the potential magnitude of error in the conclusions. If it is the case that the conclusions may underestimate the amount of PCBs remaining in the soil, the text should state that field sampling may have to be performed to verify that the LNAPL-contaminated materials do not exceed the 50 ppm limit.

* Comment 86. Section 2.3.3 and Figure 2-5. Reference is made to Figure 2-5 which shows the areas of groundwater that exceed carcinogenic risk levels in the shallow portion of the aquifer. The southwest limit of the groundwater plume shown in the figure is considerably less certain than is implied by the solid line delineating it. There remains a possibility that the plume extends further west (though it appears not as far as MW-6S or MW7S). Also, substantial data indicate that the plume is migrating in a southeastern direction rather than in a straight south direction as is shown in this figure. Solid lines should be replaced by dashed lines in those areas where the extent of the plume has not been definitively identified.

- * Comment 87. Section 2.4.1.3, page 2-16. This section should discuss the potential problems with capping such as floodwater diversion, protection of the cap from flooding, and wetland mitigation.

- * Comment 89. Section 2.4.1.3, Containment, 1st bullet, page 2-17. No technical basis is given for the statement that the "more mobile VOCs will not significantly affect the groundwater as compared to the LNAPL...", and it is not clear how this statement, even if it were supported, would be a reason why a low-permeability cap would not be necessary on the site. (Also see Section 2.4.2.3, paragraph 2, page 2-23).

- * Comment 90. Section 2.4.1.3, Containment, page 2-17. The use of drainage controls should be briefly discussed in this section.

- * Comment 92. Section 2.4.1.4, page 2-18. More information should be provided regarding the effectiveness of S/S on constituents other than inorganics. In the second paragraph of this section, it is indicated that the VOCs "would probably volatilize from the soil to acceptable soil levels" during implementation of S/S. What levels of VOCs would be volatilizing from the site? Would these levels be in compliance with ARARs? Would the levels pose acceptable risks to on-site workers and to adjacent residents? Discuss potential engineering control measures that might be necessary to prevent excessive volatilization of air contaminants during the excavation of site soils. Also, discuss the potential problems and effectiveness of the solidification/stabilization technology for treating LNAPL-contaminated materials.

- * Comment 97. Section 2.4.1.5, page 2-21. The viability of thermally enhanced soil vapor extraction should be addressed further. Steam injection coupled with groundwater collection could enhance recovery of LNAPL from the vadose zone. The additional volume of groundwater that would need to be treated due to use of steam injection should be discussed quantitatively.

- * Comment 98. Section 2.4.1.5, paragraph 1, page 2-22. In the discussion on *in situ* soil washing it is stated that soil flushing using water as the flushing liquid would not be effective at the site. What other flushing liquids are available that would solubilize compounds such as PNAs and PCBs?

- * Comment 100. Section 2.4.2.3, Containment, second paragraph, page 2-23. The statement that "it is unlikely that infiltration of water will increase the rate of dissolution of chemicals into water" would be difficult to support. Please modify.

- * Comment 103. Section 2.4.2.4, *Ex Situ* Treatment Techniques, paragraph 2, lines 1 and 2, page 2-24. Other potential groundwater treatment technologies that may be applicable to the Lenz Oil site are sedimentation, equalization, and steam stripping. The potential applicability of these technologies should be included in this section.

* Comment 104. Section 2.4.2.4, *Ex Situ* Treatment Techniques, paragraph 1, lines 6 through 10, page 2-25. Discuss why air stripping was deleted from consideration in light of the fact that vinyl chloride and chloroform are both poorly adsorbed on granular activated carbon. If air stripping is retained, potential off-gas treatment technologies should also be discussed.

* Comment 105. Section 2.4.2.4, *Ex Situ* Treatment Techniques, paragraph 2, line 1, page 2-25. Another potential groundwater treatment technology applicable to the Lenz Oil site is ultraviolet (UV) oxidation and advanced oxidation process (AOP). The potential applicability of these technologies should be included in this section.

* Comment 106. Section 2.4.2.4, Disposal Options, paragraph 1, line 1, page 2-26. Include a discussion about the disposal/reactivation of spent granular activated carbon.

* Comment 109. Section 2.4.3.3, page 2-28. Within the discussion on containment, it is stated that "capping is not necessary to prevent the migration of contaminants from the LNAPL to the groundwater because the viscosity of the LNAPL is such that it is unlikely that infiltration of water will increase the rate of dissolution of chemicals into the water or the mobility of the LNAPL." Although it is true that the viscosity of the LNAPL and the majority of the types of contaminants present are not highly susceptible to dissolution, it is misleading to imply that water flow of any kind across areas of LNAPL contamination is not a concern. Please modify.

* Comment 110. Section 2.4.2.5, pages 2-28 and 2-29. It states in the last paragraph on Page 2-28, that according to groundwater modeling described in Section 2.6.5.1, the LNAPL is not migrating toward the river "at any measurable velocity". Section 2.6.5.1 does not contain the LNAPL velocity. Provide the LNAPL velocity in this paragraph.

* Comment 112. Section 2.4.3.4, paragraph 3, page 2-29. It is stated here that S/S was retained for further evaluation for soils in Section 2.4.1.4. The paragraph then goes on to point out that "it has been demonstrated that the presence of significant concentrations of oil such as those present at the Lenz Oil site...would affect the performance of S/S" and that therefore "this technology would not be appropriate for addressing the LNAPL-contaminated soils and...will not be further evaluated". S/S is then included as a remedial component in Alternatives 3, 5, 7, and 9. Will it be possible to utilize S/S to contain the soil without the presence of oil in the subsurface and the fluctuating high water table interfering?

* Comment 113. Section 2.4.3.4, paragraph 5, page 2-29. LNAPL-contaminated material will be considered as a listed waste if the constituents in the waste are present at levels that pose unacceptable risks to human health or the environment. Revise the text accordingly.

* Comment 115. Section 2.4.3.7, Active Recovery/Disposal, paragraph 2, lines 6, 7, and 8, page 2-30. Provide engineering calculations that support the statement "The injection of steam...would add significant volumes of water to the site that would have to be treated prior to discharge". Provide quantitative discussion and cost analyses to show why an additional volume of groundwater requiring treatment due to steam injection would render the option nonviable.

* Comment 120. Section 2.6.2.1, Effectiveness, paragraph 1, lines 1, 2 and 3, page 2-34. Provide a discussion on the effectiveness of *in situ* solidification/stabilization in preventing the migration of volatile organic compounds into the groundwater.

* Comment 122. Section 2.6.3.1, Treatment, paragraph 1, lines 2 and 3, page 2-36. Discuss why in the cited lines it is stated that the "only inorganic that exceeds the POTW pretreatment requirements is total lead" when according to Table 2-14, both mercury and cyanide also exceed the POTW pretreatment requirements.

* Comment 125. Section 2.6.3.2, Disposal, page 2-37. Discuss the disposal of PCB-contaminated spent carbon.

* Comment 126. Section 2.6.5.1, page 2-40. Describe the relationship, if any, between the groundwater area to be remediated shown in Table 2-13 and the groundwater model discussed in Appendix E.

* Comment 127. Section 2.6.5.1, page 2-41, second complete paragraph. Could treatability studies answer some of the questions regarding residual oil percentages? Are the Winegardener numbers best or worst case scenarios? Explain how the types of soils in the Winegardener study compare to those at the Lenz Oil site.

* Comment 128. Section 2.6.5.1, Ground Water/LNAPL Modeling, page 2-43. One of the reasons given for limiting the rate of groundwater extraction is the resulting withdrawal of increased volumes of water which would be drawn from the Des Plaines River rather than the aquifer. If there is a desire to accelerate remediation of groundwater by pumping greater volumes of groundwater, it would be possible to construct a slurry wall between the extraction system and the river to limit the amount of water withdrawn from the river.

* Comment 130. Section 2.6.5.3, page 2-44. Provide discussion and technical basis regarding the depth at which trenches would need to be installed.

Specific Comments--Section 3.0

- * Comment 132. Section 3.1, second to last bullet, page 3-1. The remedial alternatives that include a RCRA compliant cover need to include a flexible membrane liner (FML) above the compacted clay. This is considered minimum technology for covers over hazardous waste landfills. The FML would have a required thickness of 20 mils or greater.
- * Comment 133. Section 3.1, paragraph 2, page 3-2. The depth of the "shallow portion" of the aquifer that is being assumed needs to be explicitly stated in this section, especially considering that the title of this subsection is "Depth of groundwater to be remediated".
- * Comment 134. Section 3.1, paragraph 1, lines 1 through 3, page 3-3. Is the statement true that "Only alternatives that have remediation of the soil that exceeds the carcinogenic risk of 10^{-4} were evaluated"? Table C-10 contains cost information for remediation of soils exceeding carcinogenic risks of 10^{-6} . Why is meeting RCRA clean closure requirements provided as a reason for remediating only those soils with excess carcinogenic risks of greater than 10^{-4} ?
- * Comment 135. Section 3.1, paragraph 1, lines 9 through 16, page 3-3. Delete the referenced lines. These lines are generalizations and do not contribute to the report.
- * Comment 136. Section 3.1, paragraph 2, page 3-3. It is stated here that "only alternatives that evaluate the excavation of both the LNAPL-contaminated unconsolidated soil and the LNAPL-contaminated bedrock were considered". Please check the accuracy of this statement.
- * Comment 140. Section 3.2.2.1, page 3-5. It is not made clear within the text or on Figure 3-1 whether all sides of the cap would have rip rap placed on the edges and how far out this rip rap would extend. No mention is made of the rip rap going across Jeans road, the railroad, or onto adjacent properties.
- * Comment 142. Section 3.2.2.1, page 3-6, paragraph three, lines 1 and 2. Monitoring frequency required as part of the selected remedy will be established by USEPA and IEPA in the Record of Decision for the site and will be fully described in the Operation and Maintenance Manual as part of the remedial design for the site.
- * Comment 143. Section 3.2.2.1, paragraph 3, lines 6 and 7, page 3-6. Delete "in relation to the Illinois Class I standards" and replace with "in relation to USEPA required cleanup objectives".

* Comment 144. Section 3.2.2.1, paragraph 3, lines 14 and 15, page 3-6. Delete "Illinois Class I standards (i.e., the CUOs) for two consecutive sampling events" and replace with: "USEPA required cleanup objectives for the number of consecutive sampling events required by USEPA".

* Comment 146. Section 3.2.2.1, Description of Alternative 2. In the third paragraph on page 3-6, natural attenuation is defined as consisting of "allowing the natural reactions that occur within the aquifer" to reduce the levels of contaminants. Actually natural attenuation includes a variety of processes, not only chemical reactions and biological transformations but also hydrodynamic processes such as dispersion and dilution.

* Comment 147. Section 3.2.2.2, paragraph 1, lines 6 through 10, page 3-7. Both the ground water in the upper portion of the aquifer and the surface water in the Des Plaines River exceed the FWQC for cadmium, chromium, copper, iron, and zinc. Therefore, delete the referenced lines.

* Comment 149. Section 3.2.2.2, paragraph 2, line 4, page 3-7. Delete "The Illinois Class I groundwater standards..." and replace with: "The USEPA required cleanup objectives...".

➡ Comment 150. Section 3.2.2.2, page 3-7. Table 2-14 is referenced within this section with regard to FWQC. Table 2-14 does not contain any FWQC information.

* Comment 152. Section 3.2.2.2, paragraph 1, lines 5 through 9, page 3-8. Delete the following text: "Because the soil contaminants remaining at the site do not contribute significantly to groundwater contamination (see Section 2.4.1.3), the failure of the cap would increase the potential risk through direct contact but pose little or no concern for further groundwater contamination from the soil contaminants." This statement would be difficult to support.

As stated previously, by comparing the extent of the LNAPL plume presented in Figure 2-7, with the shallow groundwater plume presented in Figure 2-5, it is evident that a significant portion of the groundwater plume lies upgradient of the LNAPL plume.

* Comment 155. Section 3.2.3.1, 3rd bullet, page 3-9. Delete "a carcinogenic risk of 10^{-4} " and replace with: "USEPA required cleanup objectives".

* Comment 157. Section 3.2.3.2, paragraph 1, lines 9 through 11, page 3-10. Delete the following text: "As indicated in Table 2-14, the discharge of the existing, untreated groundwater to the river would not cause an exceedence of the FWQC." Both the groundwater in the upper portion of the aquifer and the surface water in the Des Plaines River exceed the FWQC for cadmium, chromium, copper, iron, and zinc.

- * Comment 163. Section 3.2.4.2, paragraph 2, line 2, page 3-15. Delete "the contaminated soil and bedrock..." and replace with: "the LNAPL-contaminated soil and bedrock..."
- * Comment 171. Section 3.2.5.2, paragraph 1, lines 3 and 4, page 3-18. Delete the statement "The Illinois Class I groundwater standards would be met through natural attenuation reactions". Untreated groundwater in excess of Illinois Class I groundwater standards would remain on-site.
- * Comment 173. Section 3.2.6.1, paragraph 2, lines 5 through 7, page 3-21. According to a review of Figure 3-7, the trenches are approximately 280 feet in length and the third trench is approximately 135 feet south of Jeans Road. Indicate whether the text or the figure is correct.
- * Comment 174. Section 3.2.6.1, paragraph 2, line 15, page 3-21. According to a comparison between Figures 3-6 and 3-7, trenches A and C appear to intersect only the periphery of LNAPL Area 1. Please provide a discussion clarifying the reason for this.
- * Comment 175. Section 3.2.6.1, Description of Alternative 6. It is stated that the LNAPL/groundwater extraction system has been selected based on the modeling results in Appendix E. Appendix E does not give any information to support the design of these trenches. Also, it is not clear to what depth groundwater will be remediated.
- * Comment 179. Section 3.2.7.2, paragraph 5, line 2, page 3-27. Explain why the volume of cap material in Alternative 7 is 47,000 cubic yards, while the volume of material for Alternative 5 is 44,000 cubic yards.

Specific Comments--Appendix C

- * Comment 182. Table C-2. Include table references so that the reader can go directly to the pertinent cost detail. Determine if some of the costs for Alternatives 4, 5, 8, and 9 were accounted for twice. Specifically, the costs associated with excavation of Area 1 soils (Alternatives 4, 5, 8, and 9), the relocation of residents and employees (Alternatives 4, 5, 8, and 9), and the mobilization of the LTTD unit (Alternatives 4, 5, 8, and 9). This may result in a \$400,000 cost differential.
- * Comment 183. Table C-4. The table indicates that seven monitoring wells and one piezometer will be installed as a common element to the groundwater monitoring technology. Although the monitoring wells are shown in the figures (specifically, Figures 3-1, 3-3, 3-5, 3-6, 3-7, 3-9, 3-10, and 3-12), there is no mention of these activities or the rationale behind them in the Section 3.0 text. Explain.

* Comment 184. Table C-7. The quantity of ditch excavation presented in the table is 570 cubic feet. However, assuming an 8 foot wide ditch, with 3:1 side slopes and a length of 1,920 feet, would result in a ditch excavation of approximately 10,000 cubic feet. Clarify.

Also, Means Heavy Construction Cost Data (1994) presents rip rap costs in units of cubic yards for slope protection, whereas the units in Table C-7 are in square feet. Please check.

* Comment 185. Table C-8.

On page 1 of 5:

- Cost per cubic yard of disposal of soil via incineration at Coffeyville, KS facility is high.
- Provide the basis for the costs associated with temporary relocation of residents (i.e., numbers of residents, number of employees, per diem, intangibles). Provide a basis for the air monitoring costs.
- Discuss the reason why the quantity of LNAPL-contaminated soil in Table 2-13 is 4,700 cubic yards, while that presented in Table C-8 is 4,900 cubic yards.
- Provide an explanation for the two different types of backfill excavation.

On page 2 of 5:

- Include costs for a trial burn, feed preparation, and confirmation sampling in Table C-8.

On page 3 of 5:

- Include costs for transportation of treated soil to the offsite disposal facility in Table C-8.

On page 4 of 5:

- Include costs for transportation of treated soil to the offsite disposal facility in Table C-8.

On page 5 of 5:

- Describe the type of sampling included in Table C-8.
- Describe why only one type of backfill is presented in the table, whereas in previous parts of the table two types of backfill are presented.

* Comment 187. Table C-11. The table title is "LNAPL & Ground Water Recovery with 1 trench, 2 Lines of Wells." However, the table includes excavation costs for three trenches. Clarify. Verify if the 120 extraction wells indicated in the table is correct. If there are 120 extraction wells, describe why 126 pumps are required.

* Comment 188. Table C-12. Assuming that the dimensions of the trenches are 200 feet long and 2 feet wide, based on the quantities presented in Table C-12, the depths of Trenches A, B and C are: 5.9, 8.1, and 9 feet, respectively. These depths are not the same as the depths presented in Section 3.2.6.1. Clarify. Explain the basis for the soil analysis presented in the table.

Specific Comments--Appendix E

* Comment 191. Section 1.0, Introduction. The "required groundwater capture zone" presented in Figure E-1 is too small. The southwest limit of the groundwater plume shown in the figure is considerably less certain than is implied by the solid line delineating it. There remains a possibility that the plume extends further west (though apparently not as far as MW-6S or MW-7S) and consequently, capture may be required to extend further west. It does appear that all the capture scenarios modeled in this appendix do capture a large enough area.

* Comment 192. Section 3.0, Model Alternatives. The first sentence of this section states "The following three remedial scenarios...". The section then lists four scenarios. Does Figure E-3 represent the first scenario listed in this section? If so, the figure does not show any extraction trenches. Some clarification regarding the difference in the simulation models between a passive recovery trench and an active recovery trench is needed.

* Comment 193. Section 3.4, Hydraulic Conductivity. Reference should be made in the first paragraph of this section to Figure E-12 which shows the kriged hydraulic conductivity field. Review of the kriged values would be facilitated by the posting of the locations of the measured hydraulic conductivity data points on the figure and inclusion of a table showing the measured value for each point.

It is not clear from the second paragraph of this section if the hydraulic conductivity values for the bedrock are being kriged (as was done for the unconsolidated). Although later (on page E-7 in Section 4.1.1) it is revealed that the geometric mean is being used rather than kriging the data, this section is confusing.

* Comment 194. Section 3.5, Boundary Conditions. While using a constant head boundary for the boundary south of the site is reasonable (because of the presence of the Des Plaines River), the basis for the constant head boundary north of the site is not well substantiated. Apparently, this boundary is fairly close to the site. Under extraction scenarios, a constant head boundary acts as a source of water. For a river this is a realistic assumption; but to the north there is little justification to assume such a source of water. What testing has been done to assure that the boundary is not influencing the simulation of the site or artificially supplying recharge to the aquifer?

* Comment 195. Section 4.1.1, Ground Water Model (Specifications of Parameters). The first paragraph of this section discusses the model grid and cites Figure E-10 as showing the site grid. This figure shows the site with a very coarse grid superimposed. It does not show the 89 by 131 cell grid mentioned in the text. A figure showing the actual grid and boundaries used in the simulation modeling, including the variation in grid spacing used in this simulation, is required.

The second paragraph of this section discusses the generation of the top of bedrock (bottom of unconsolidated deposits) surface. Does this surface reflect the steep ridge composed of unweathered dolomite bedrock north of the site mentioned in Section 3.5? This ridge was cited as the justification for the northern boundary of the simulation model.

The first paragraph on page E-8 discusses the constant head boundaries. Exactly how was the northern boundary extrapolated from ground water data? The head at the boundary apparently was set to 590.8. Since there is no figure showing the location of the boundary, it is difficult to compare this value with known water levels. The water level measured 9/27/91 (the date according to Section 3.3 that the modeling was to be calibrated) at G101D, the northern most well on site, is 591.77. This is nearly a foot higher than the constant head value. The rationale and process for determining the constant head value needs to be given.

How are the extraction trenches being simulated using MODFLOW? Similarly, how are the extraction wells being simulated (e.g., within which layer(s) do they penetrate)? This has not been discussed and needs to be.

* Comment 196. Section 4.1.2, LNAPL Model. The first paragraph of this section discusses the model grid and cites Figure E-6 as showing the site grid. This figure shows the site with a very coarse grid superimposed and a portion of the grid obscured by a soil cap. Figure E-6 does not show the 50 by 50 cell grid mentioned in the text. Where and what type were the boundaries used in ARMOS? Were they same as for MODFLOW? A figure showing the actual grid and boundaries used in the LNAPL simulation modeling is required.

Why was a constant value used for hydraulic conductivity (K) in the unconsolidated deposits in ARMOS while a spatially varying variable used in MODFLOW?

What is the basis for setting the anisotropy ratio $R = 1.015$? What is the basis for selecting the value of "w"?

Why is there a difference in the recharge value used in the MODFLOW model (12 inches/year) versus that used in the ARMOS model (3.5 inches/year)?

The last paragraph on page E-10 states that water level and LNAPL level values were based upon measurements made October 25, 1994. According to the text, data from this date were selected because they were the most recent. According to Technical Memorandum No. 4, levels were also measured on 11/1/94 and 11/8/94. A better reason to select the round of level measurements would be to select a round when values are considered to be representative or when LNAPL thickness was at a maximum. Explain.

* Comment 197. Section 4.2, Calibration. Were both the MODFLOW model and the ARMOS model calibrated? Specifically, which parameters were adjusted and how did they change during calibration? Was calibration conducted by trial and error or by the use of a linear programming optimization program?

* Comment 198. Section 4.2.1, Ground Water Model and Table E-1. Table E-1 gives calibration statistics. For each well the table should identify for which layer the well is a calibration target. In two cases, G101 and G102, it is not indicated which well (L, M, or D) in the nest is being referred to.

How were calibration targets selected? It appears that not all monitoring wells were used as calibration targets. Please explain why some were not used.

* Comment 199. Section 4.2.1, Ground Water Model. Discussion is needed about the spatial distribution of the residuals. Residuals do not seem random (as they should be).

One of the calibration criterion given was that the absolute value of the residual (difference between measured head and modeled head) at each target be less than 1. However, for a few targets the calibration error was slightly greater than 1. Explain.

Given that the range in measured head is less than 3 (and the range in modeled head is even less), the allowed calibration error is a very large proportion of the total variation in modeled head. Explain.

More discussion of why the calibrated model is good enough and how the calibrated model cannot be improved (beyond saying it is "acceptable considering the complexity of modeling fractured bedrock") is required. If the assumption made in Section 3.4 that the bedrock may be treated as an equivalent porous media is reasonable, then complexity of fractured bedrock should not be an issue; if complexity of fracture bedrock is an issue then the assumption is questionable. Some serious discussion about the quality of the calibration and the ramifications to the uncertainty in the resulting model is needed.

There is no discussion of the mass (water) budget for the ground water model (MODFLOW). Ideally the mass budget is also examined during calibration.

* Comment 200. Section 4.3.1, Ground Water Model (Sensitivity Analysis). Exactly which parameters were involved in the sensitivity analysis? The only parameter discussed is recharge. How sensitive is the model to hydraulic conductivity? How sensitive is the model to changes in the constant head boundaries (values, location)?

* Comment 201. Section 4.3.2, LNAPL Model (Sensitivity Analysis). Exactly which parameters were involved in the sensitivity analysis? The only parameters discussed are maximum residual oil saturation and oil to water viscosity ratio. How sensitive is the

model to hydraulic conductivity? How sensitive is the model to changes in measured LNAPL thickness? How sensitive is the model to changes in the boundaries?

* Comment 202. Section 5.1.1, Initial Conditions and Figure E-14. Does Figure E-14 represent predicted heads in layer 1 or layer 2 or both layers? The particle path lines are shown partially as solid lines and partially as dashed lines. What is the significance of this distinction?

* Comment 203. Section 5.1.3, Extraction Trench Model Simulation. It is not clear how the extraction trenches were represented in the model. Were they modeled in MODFLOW using the drain package? How was the extraction rate of 13 gpm per trench determined? Was this extraction rate optimized? Was an equal extraction rate from each trench the optimal scenario?

* Comment 204. Section 5.1.4, Extraction Trench and Extraction Well Model. Why were extraction rates of 13 gpm per trench and 4 gpm per well used? It would seem that if the extraction trenches removing 13 gpm/trench were sufficient to capture the plume, adding the 4 wells at 4 gpm/well is overkill for containment. What extraction rates were tried for this scenario?

* Comment 205. Section 5.1.5, Southern Extraction Well Model Scenario. How were these extraction rates determined? Are these the lowest rates that completely capture the plume?

* Comment 206. Section 5.2.2, Trench Extraction Model Simulations. There appear to be two typos in the table references in the first paragraph of this section. Is Table E-5 (first line of the section) supposed to be Table E-4? Is Table E-6 (last line of the first paragraph) supposed to be Table E-5?

Was any modeling done with ARMOS to test different extraction rates (to determine that 13 gpm was indeed optimal)?

On page E-17 (third paragraph), a problem with the model code is identified related to low S values and lower viscosities. It is stated that results should be considered "approximate". It is unclear what this means. If results are not even qualitatively correct (that is, the model results scenario A recovery is larger than scenario B recovery, but in fact B recovery really is larger than A), how is one to use the results?

* Comment 207. Section 6.0, Summary. There has been no discussion of uncertainty in this modeling. There needs to be a discussion of the simulation model results' sensitivity to uncertainties in the input parameters, simplifications in the conceptual model, and level of error in the calibration. The range of error and uncertainty in the models needs to be considered when drawing conclusions about the model results.

It is stated here that attempting to accelerate the remediation of ground water by drawing greater volumes of ground water may not result in greater efficiency. However, no analysis is provided in the report to support this conclusion. While some of the modeled scenarios did result in pulling larger amounts of water from the southern boundary (i.e., Des Plaines River) it is not clear that it would be impossible to increase the rate of remediation of ground water. For example, a scenario with a slurry wall might allow accelerating ground water remediation without drawing excess water from the river. Since estimation of clean-up times was only minimally evaluated in the revised FS report, and clean-up time estimates for an expedited extraction scenario are not provided, it is very difficult to evaluate the trade off between extracting water from the river and speeding clean up.

Specific Comments--Tables

➡ Comment 210. Table 1-4, page 3 of 7. The last column has a heading of "LOSB204BS" which should be "LOSB04BS."

➡ Comment 212. Table 1-6. For G102S and P24S, the key states the blank spaces indicate no LNAPL was detected at this location. However, there are blank spaces under the depth of water column. The blank spaces for G102S and P24S do not correspond to the key. Clarify.

Under 9/9/94 for P08, the number 592.55 is shown as 592.56 on Figure 1-25. Correct. Under Location for P06(2), discuss why this location is flagged with "(2)" when the "Corrected Piezometric Surface" column is also flagged with "(2)."

➡ Comment 213. Table 1-7. Include the sampling depth interval for sample location 12A. Describe why sample location SB14R: 0-4.5' is not presented on Figure 1-33, but is listed in Table 1-7.

Under the Shallow-Area B column:

- Phase II sample location SB209AS is shown in Table 1-7, but not shown in Figure 1-34. Clarify.
- Sample locations SBNR and SB209AS are listed but not shown in Figures 1-33 and 1-34. If no contaminants were detected, then the figures should reflect it. Determine if the reader should assume there were no detects.

➡ Comment 214. Table 1-8. Describe why location 12A does not show its respective sampling depth interval.

➡ Comment 215. Table 1-9. It appears that the sample locations under Shallow-Area A column are not the only sample locations being used in Table 1-12 for pesticides/PCBs.

There are other sample locations from Figure 1-39 being used (i.e., maximum detected for Aroclor-1242 is 12,000 from SB06, which is not on Table 1-9). Explain.

Under the Shallow-Area B column, sample locations for SB02, SB03, SB14R, SB15R, SB20, and SB23R do not have detection boxes on Figure 1-39 nor in Table 1-14. State whether these sample locations have no detections.

Under the Deep Area A column:

- Sample SB06: 5-9' was not found on Figure 1-39 and in Table 1-14. State that no detections were found at this location.
- Sample SB09: 5-7' is shown as SB09 5-9' on Figure 1-39. Clarify.
- SB18: 7.5-9.5' and SB18: 9.5-12.5' were not found on Figure 1-39 and in Table 1-14. State that no detections were found at these locations.

Under the Deep Area B column:

- Samples SB01: 5-9', SB01: 9.5-12.5', SB02: 5-7.5', SB02: 7.5-8.7', SB20: 4.5-9.5', and SB20: 9.5-12.5' do not have detection boxes on Figure 1-39. The text does not state there were no detections at these locations. It should be stated somewhere and not assumed.
- Sample SB22: 7.5-9.5' does not have a detection box on Figure 1-39. Explain.

➡ Comment 216. Table 1-10. Sample location 12A does not show sampling depth intervals. Explain.

➡ Comment 217. Table 1-11. Under the Area A column, methylene chloride shows the minimum detected and maximum detected as "No," but has a "1" under the Number of Detects column. Sample SB18 in Figure 1-33 shows methylene chloride was detected at a concentration of 100.0 BJ. Clarify. For sample SB17, under "Area A Minimum Detected" column, change toluene from 17 to 4 J.

Under the Area B-Number of Samples Collected column, it states 33 samples were collected, but only 32 were listed in Table 1-7. Determine if the extra sample is a background and indicate which background. Describe why a background sample was not accounted for under column A.

Under the Area B Minimum Detected column, change benzene to 4 J from 8, based on Figure 1-34 sample SB201BS.

➡ Comment 218. Table 1-12. Clearly show sample locations for pesticide/PCB samples. Under the Area B-Number of Samples Collected column, 33 is shown, but 32 is shown in Table 1-18. Clarify. Under the Area B-Number of Detects column, change bis (2-ethylhexyl)phthalate from 5 to 6.

Under the Area B column:

- Di-n-butylphthalate should have a minimum detection of 280 J and not 92 J.
- The number of detects should be 2 and not 3.
- Fluorene has number of detects at 4 and it should be 3.

Under the Area A-Minimum Detected column, aldrin is 9.3. On Figure 1-39, the only sample location with 9.3 for aldrin is SB07, which is not listed on Table 1-9. Clarify.

Under the Area A-Number of Samples Collected column, in the pesticides/PCBs section there are nine samples. If more samples are being used as stated in Table 1-9, then it should be stated in Section 1.5.1.1. Explain. Under the Area B-Number of Samples Collected column, change pesticides/PCBs from 33 samples to 32, based on Table 1-9.

Under the Area the B column:

- Change aldrin from 1.9 JP to 1.9 P, based on Table 1-14, sample SB03AS, and change Number of Detects from 1 to 2.
- Change Number of Detects for Aroclor-1254 from 9 to 8 and Maximum Detected from 1700 P to 1400, and Aroclor 1260 from 3 to 2 and Maximum Detected from 3700 P to 900 J, based on samples listed in Table 1-9 under the Shallow-Area B column.
- Change alpha chlordane from 2 to 1 and Minimum Detected and Maximum Detected from 3 P to 3.7 P and 3.1 P to 3.7 P, respectively; 4,4'-DDE from 7 to 5, 4,4'-DDT from 7 to 5 and 1.2 P to 1.2 JP; 4,4'-DDD from 7 to 6; based on samples in Table 1-9 under the Shallow-Area B column.
- Change gamma chlordane from 2 to 1 and 1.9 P to 3.6 P, based on samples in Table 1-9 under the Shallow-Area B column.

➡ Comment 219. Table 1-13. The Area A-Number of Samples column has varying samples, such as 5, 19, and 21. Explain in text which parameters were used in which samples and why. Antimony shows ND and should be 8.30 BJ for Minimum Detected and Maximum Detected and 1 for Number of Detects under Area A column. See Figure 1-42, sample location SB04AS, for the detected compound. Under the Area A column, Number of Detects should be 13 not 12 for arsenic. Under the Area A-Number of Detects column, vanadium has 20 and should be changed to 21 and Minimum Detected should be 6.6 B according to sample location SB04 2.5-5' on Figure 1-40.

Under the Area A-Maximum Detected column, change manganese from 663 to 1,110.00 J, based on sample SB10AS on Figure 1-42. Under the Area A-Minimum Detected column, change copper from 60.8 J to 47.3 J, based on sample SB18 on Figure 1-41.

Under the Area A column:

- Cadmium's Number of Detects should be changed from 12 to 13. Explain why the Number of Samples is 5.

- Cadmium's Minimum Detected should be changed from 1 J to 0.71 BJ, based on sample SB13 on Figure 1-40.
- Chromium's Minimum Detected should be changed from 7.9 to 19.60 J, based on sample SB12AS on Figure 1-42. The 7.90 came from sample SB211AS which is located in Area B and not in Area A.
- Change mercury's Maximum Detected to 0.79 from 0.16, based on sample SB10AS on Figure 1-42. Change the number of detects to 9 from 8.

Under the Area A-Minimum Detected column, change silver to 1.30 B from 2.9, based on sample SB04AS on Figure 1-42. Change the number of detects from 1 to 3.

Under the Area A-Number of Detects column, change sodium from 12 to 20. Explain why the Number of Samples is 5. Under the Area A-Minimum Detected column, change sodium from 1,250 to 183 B, based on sample SB09. Under the Area B-Number of Samples column, explain why the number of samples varies from 21 to 32. The highest number is 32, but according to Table 1-10 under Shallow-Area B column, there are 31 sample locations. Explain.

Under the Area B column:

- Change aluminum from 31 to 30, based on samples in Table 1-10 under the Shallow-Area B column.
- Change aluminum from 22,300 J to 19,000 J, based on sample SB21 on Figure 1-41. It appears that 22,300 J came from sample SB17 on Figure 1-41, which is in Shallow-Area A according to Table 1-10.
- Change arsenic from 32 to 31, based on samples in Table 1-10 under the Shallow-Area B column.
- Change arsenic from 17.9 J to 19.0 J, based on sample SB16R 0-4.5' on Figure 1-41.
- Explain why antimony has 28 under the Number of Samples.
- Change barium parameter from 25 to 31 and change 32 to 31, based on samples in Table 1-10 under the Shallow-Area B column.
- Change barium from 51.1 to 8.30 B, based on sample SB211BS on Figure 1-43
- Change cadmium from 1.7 to 0.59 BJ, based on sample SB23R 2.8-4.5'. Explain why 21 is listed under Number of Samples.
- Change calcium from 32 to 31 and change 19,800 to 19,800 J, and change chromium from 32 to 31, based on samples in Table 1-10 under the Shallow-Area B column.
- Change cobalt from 12 to 31 and from 32 to 31. Change 11.9 to 2.70 B, based on sample SB212AS from Figure 1-42. Sample SB12AS is from Table 1-10 under the Shallow-Area B column.
- Change copper from 25 to 27; iron from 32 to 31; lead from 32 to 31 and from 4.7 to 4.7 J; magnesium from 32 to 31; both manganese parameters from 32s to 31s; mercury from 17 to 14 and 32 to 31; nickel from 32 to 31, 20 to 22, and 9.5 to

5.10 B, potassium from 32 to 31, 19 to 31, 1,390 to 121 B, and 6,910 to 6,150; and selenium from 32 to 31; based on samples in Table 1-10 under the Shallow-Area B column.

- Explain why silver has 21 samples instead of 31.
- Change sodium parameters from 14 to 31, 21 to 31, and change 470 to 146 B; vanadium from 24 to 31, 32 to 31, and 11.2 to 2.90 B; and zinc from 31 to 30 and 32 to 31; based on samples in Table 1-10 under the Shallow-Area B column.
- Change cyanide from 0.6 to 0.33, from sample SB14R on Figure 1-40, based on samples in Table 1-10 under the Shallow-Area B column. Explain why the Number of Samples is 28 and not 31.

Under the Background column:

- Change potassium from 1,160 to 1,090.0 B and 2 to 3, based on sample SB213AS on Figure 1-42.
- Change vanadium from 21.1 to 25.0 based on sample SB214AS on Figure 1-42.

➡ Comment 220. Table 1-15. Under the Area B-Number of Samples Collected column, there is 19 instead of 20, based on samples in Table 1-7 under the Deep-Area B column.

Under the Area-B column:

- Change 1,1-dichloroethane under Minimum Detected column from 130 to 24, based on sample LOSP24E on Figure 1-47.
- Change ethyl benzene from 6 to 7, trichloroethene from 3 to 4, toluene from 4,300 to 4,000, 1,1,1-trichloroethane from 2 J to 5 J, xylenes (total) from 7 to 8, and 2-butanone from 3 to 4, based on samples in Table 1-7 under the Deep-Area B column.
- Change 1,2-dichloroethene (total) from 170 to 140, based on samples in Table 1-7 under the Deep-Area B column and sample LOSP24E on Figure 1-47.

➡ Comment 221. Table 1-16. Under the Area A column, change benzo(k)fluoranthene from 2 to 3, and phenanthrene from 6 to 7, based on samples in Table 1-8 under the Deep-Area A column. Aldrin is not shown, but was found in sample SB07 5-9' on Figure 1-39 based on samples in Table 1-9 under the Deep-Area A column. Clarify.

Under the Area A column:

- For Aroclor-1254 change both NDs to 370 and 0 to 1, based on sample SB09 5-9' on Figure 1-39.
- Change Aroclor-1260 from 1 to 3, under Minimum Detected change 94 to 42 JP, and under "Maximum Detected" change 94 to 240 JP.

Under the Area B-Number of Samples Collected column, change 18 sample locations to 19, based on Table 1-8 (Deep-Area B column). Change 18 to 19, based on Table 1-10 under the Deep-Area B column for semivolatiles.

Under the Area B column:

- Change benzo(b)fluoranthene from 6,200 to 6,200 J, based on sample SB14AS on Figure 1-38.
- Change naphthalene from 10,000 to 5,200 and 6 to 5, based on samples in Table 1-8 under the Deep-Area B column.
- Change carbazole from 1,130 J to 430 J. If only one sample was detected for this parameter, make sure the minimum and maximum number of detections are the same.
- Change dibenzofuran from 88 J to 850 J, based on sample SB14AS on Figure 1-38.
- Change phenanthrene from 6 to 7, and di-n-butyl-phthalate from 2 to 3, based on samples in Table 1-8 under the Deep-Area B column.
- Change Aroclor-1254 from 11 to 7, 59 J to 40, and 6,000 to 6,900, based on samples in Table 1-9 under Deep-Area B column and assuming samples SB22: 5-10' and SB22: 10-15' from Figure 1-39 represent sample SB22: 7.5-9.5 from Table 1-9.

Under Area B-Number of Detects column, change Aroclor-1242 from 9 to 8. The only way to get 8 detects is to assume that SB22: 7.5-9.5' from Table 1-9, includes samples SB22: 5-10' and SB22: 10-15', from Figure 1-39. Explain and clarify.

Under the Area B-Number of Samples Collected column, Pesticides/PCBs has 18 samples, but Table 1-9 shows 20 samples under the Deep-Area B column. Clarify.

➡ Comment 222. Table 1-17. Under Area A-Number of Samples, explain why numbers vary from 4, 8, and 10. Explain why certain parameters were not sampled while others were according to the varying sample numbers for the parameters.

Under the Area A column:

- Explain why the antimony is 4 and not 10.
- Change barium from 9 to 10; beryllium from 0 to 3, under Minimum Detected change ND to 0.35 B, and under Maximum Detected change ND to 0.98 B; change cadmium from 3 to 4 and 0.97 to 0.67 BJ; and cobalt from 6 to 10 and 11.2 to 2.20 B; based on samples in Table 1-10 under the Deep-Area A column.
- Change magnesium from 80,500 to 85,600, based on sample SB05: 5-9' on Figure 1-46, using Table 1-10 under the Deep-Area A column.
- Change nickel from 6 to 8 and 17.5 to 5.90 B; potassium from 9 to 10 and 1,480 to 521.00 B; sodium from 5 to 10 and 981 to 120 B, based on samples in Table 1-10 under the Deep-Area A column.
- Describe why 8 is used instead of 10 for selenium. Indicate which samples were not analyzed for selenium. Remember to use samples from Table 1-10 under the Deep-Area A column.
- Change thallium from ND to 0.62 B and 0 to 1, based on samples in Table 1-10 under the Deep-Area A column and sample SB04 BS on Figure 1-43.

- Change vanadium from 8 to 9 and 11.5 to 8.30 B, based on samples in Table 1-10 under the Deep-Area A column and sample SB12BS on Figure 1-43.

Under the Area B-Number of Samples column, the amount varies from 9 to 16. Explain. Under the Area B-Number of Samples column, change 16 to 17, based on samples in Table 1-10 under the Deep-Area B column. If the number 16 is incorrect, check the other samples in this column as well. Under the Area B-Number of Detects column, change aluminum from 16 to 17, and arsenic from 16 to 17, and based on samples in Table 1-10 under the Deep-Area B column.

Under the Area B column:

- Change barium from 10 to 14, based on samples in Table 1-10 under the Deep-Area B column.
- Change beryllium from 1 to 6. Under Area B-Minimum Detected column, change 1.6 J to 0.24 BJ.
- Change cadmium from 1 to 2, 1.3 J to 1.1 BJ, and 3.8 to 1.3 J; calcium Number of Detects from 16 to 17 and 166,000 to 223,000, based on samples in Table 1-10 under the Deep-Area B column.

Under the Area B-Number of Detects column, change chromium from 16 to 17 and cobalt from 6 to 15 and 3.9 to 3.00 B, based on samples in Table 1-10 under the Deep-Area B column. Under the Area B column, change copper from 15 to 17, based on samples in Table 1-10 under the Deep-Area B column. Under the Area B-Number of Detects column, change iron from 16 to 17, lead from 16 to 17, and magnesium from 16 to 17; based on samples in Table 1-10 under the Deep-Area B column. Under the Area B Number of Detects column, change manganese from 16 to 17 and 567 J to 578 J, based on Sample SB02 (7.5-8.7') on Figure 1-46 and samples in Table 1-10 under the Deep-Area B column.

Under the Area B column:

- Change nickel parameter from 7 to 9, potassium from 14 to 17, silver from 4 to 5, vanadium from 13 to 16, and zinc from 14 to 15, based on samples in Table 1-10 under the Deep-Area B column.
- Change sodium from 9 to 14 and 374 to 188.00 B, based on sample SB19BS on Figure 1-43 and samples in Table 1-10 under the Deep-Area B column.

➡ Comment 223. Table 1-19. Indicate sampling depth interval for sample location. Sample locations SB12A, SB13, SB17, and SB18 under Shallow-Area A column did not have detection boxes on Figure 1-39 and were not listed in Table 1-14. Determine if this means there are no detects.

Under the North Ditch Bank column, change benzo(a)anthracene from 3 to 4; benzo(a)pyrene from 5 to 6; benzo(b)fluoranthene from 5 to 6, benzo(g,h,i)perylene from

5 to 6, benzo(k)fluoranthene from 5 to 6, chrysene from 5 to 6; fluoranthene from 4 to 5; indeno(1,2,3-cd)pyrene from 5 to 6; pyrene from 5 to 6, phenanthrene from 5 to 6 and 800 to 950, based on samples on Figure 1-51. Under South Ditch Bank column, dichlorodifluoromethane is shown as a TIC on Figure 1-51 for sample SS05B. Determine if a TIC should be listed on Table 1-10. Under South Ditch Bank column, change anthracene from 3 to 4; benzo(a)anthracene from 4 to 5; benzo(a)pyrene from 4 to 5; benzo(b)fluoranthene from 4 to 5; benzo(g,h,i)perylene from 4 to 5 and 1600 to 1600 J; benzo(k)fluoranthene from 4 to 5; chrysene from 5 to 6; fluoranthene from 5 to 6; indeno(1,2,3-cd)pyrene from 4 to 5; pyrene from 2 to 6; dibenzofuran from 1 to 2; and phenanthrene from 5 to 6, based on samples on Figure 1-51.

➔ Comment 224. Table 1-20. Under the South Ditch Bank column, change sodium from 4,910 to 4,650, based on samples on Figure 1-52 and sample SS01B; change iron from 33,900 to 33,400; and manganese from 369 J to 396 J and 1,170 J to 1,130 J, based on samples on Figure 1-52. Under the North Ditch Bank column, change iron from 23,400 J to 28,100 J, based on samples on Figure 1-52.

➔ Comment 225. Table 1-21. Note 4 states "...sample SD01 was chosen as the background..." Indicate if SD01 should be changed to SW01.

Comment 226. Tables 1-22 and 1-24.

In Table 1-22, it appears that either parameters were dropped or were shown as ND if they had been flagged with a B. The "B" qualifier for the inorganic data in Table 1-22 appears to have been incorrectly defined. In Figure 1-54, the "B" qualifier is defined as "Analyte also detected in blanks." This definition is true for organics but generally incorrect for inorganics. For inorganics, "B" is typically defined as "reported value is less than SQL, but greater than the IDL". Clearly state how the "B" qualifier is being used for both organics and inorganics.

Additionally, if a parameter is found in a blank, it does not automatically make the parameter unusable. If parameters are dropped, justification as to why this was done must be provided.

To "reinstate" the data that were omitted, please do the following: Add and define "B" in the figure key. Under Background for chromium, change ND to 4.10 B, based on sample SW01 on Figure 1-54. Under Background for barium, change ND to 92.20 B, based on sample SW01 on Figure 1-54. Under Background for calcium, change 140,000 to 144,000, based on sample SW01 on Figure 1-54. Under Background for copper, change ND to 18.10 B, based on sample SW01 on Figure 1-54. Under Background for nickel, change 9.9 to 9.9 B, based on sample SW01 on Figure 1-54. Under Background for potassium, change ND to 3,620.00 B, based on sample SW01 on Figure 1-54. Under Background add cobalt at 4.60 B, based on sample SW01 on Figure 1-54. Under Background for vanadium, change ND to 4.40 B, based on sample SW01 on Figure 1-54.

Under Surface Water, change chromium from 3 to 4, based on samples on Figure 1-54. Under Surface Water, change aluminum from 4 to 5 and 2,890 to 176 B, based on samples on Figure 1-54. Show calculations to support reasons for dropping parameters.

➡ Comment 227. Table 1-24. Under Background, add selenium at 0.33 B. Define B in the table key. Explain why this detect is noted, whereas the other B-flagged parameters were dropped in previous tables.

Under sediments, change barium from 86.3 to 73.3, and calcium from 32,000 to 32,000 J, based on sample SD02 on Figure 1-54. Under Sediments, change potassium Number of Detects from 5 to 4, 1,330 to 846 and 8,500 to 1,990, based on Figure 1-54.

➡ Comment 228. Table 1-28. Table 1-28 should include RCRA characteristic levels. Under Semivolatile Organics, change acenaphthene from 230,000 J to 58,000 J and 3 to 1, based on samples on Figure 1-58. Under Semivolatile Organics, add "acenaphthalene" with the following: Minimum Detected as 170,000 J, Maximum Detected as 230,000 J, Number of Detects as 2, and Number of Samples Collected as 5, based on samples on Figure 1-58. Under Semivolatile Organics, change phenanthrene from 260,000 J to 640,000 J, based on samples on Figure 1-58. Semivolatile Organics includes "1,4-Dinitrotoluene" but is shown as "2,4-Dinitrotoluene" on Figure 1-58. Correct.

Under Inorganics, change aluminum from 22.3 to 21.4 and 4 to 2; arsenic from 5.0 to 5.0 J and 5 to 2 under Number of Detects; barium from 121 to 146 and 5 to 2 under Number of Detects; calcium from 322 to 174 and 5 to 2 under Number of Detects; chromium from 6.5 to 5.7 and 5 to 2 under Number of Detects; copper from 2.0 to 2.2, 3.9 to 2.2, and 3 to 1 under Number of Detects; iron from 44.7 to 143 J and 5 to 2 under Number of Detects; lead from 81 to 107 J, 150 to 127 J, and 5 to 2 under Number of Detects; manganese from 1.1 to 1.4 J, 2.1 to 2.3 J, and 5 to 2 under Number of Detects; nickel from 1.4 J to 1.3 J and 2.3 J to 2.1 J; selenium from 0.2 J to 0.18 J, 0.5 J to 0.37 J, and 3 to 2 under Number of Detects; vanadium from 5 to 2 under Number of Detects; and zinc from 4 to 2 under Number of Detects; based on samples on Figure 1-60. Under Inorganics, add "magnesium" and the following: Minimum Detected as "6.2," Maximum Detected as "16," Number of Detects as "2," and Number of Samples collected as "5," based on samples on Figure 1-60.

Determine why the Number of Samples collected for zinc is 4 instead of 5.

➡ Comment 229. Table 1-29. Under Area A-Total Samples, 6 is listed under Semivolatile Organic Compounds. It is unclear on Figures 1-61 and 1-62 which locations were sampled for semivolatiles. Clarify. Area B-Total Samples lists 5 but it is unclear in Figures 1-61 and 1-62 which samples are being referred to. Clarify. Background-Total Samples lists 2 but it is unclear on Figures 1-61 and 1-62 which samples are being referred to. Clarify.

➔ Comment 230. Table 1-30. Under Area A, change barium from 178 J to 115 J, based on sample MW-45 on Figure 1-65. Under Area B Number of Detects column, change cobalt from 3 to 4, based on samples on Figures 1-65 and 1-66. Under Area B, change cobalt from 4 to 3.7, and nickel from 386 to 50.7, based on sample MW-35 on Figure 1-65. Under Background, change Number of Detects for copper from 2 to 1.

➔ Comment 231. Table 1-31. Under Area A:

- Change barium from 52 to 43.2, based on sample MW-4S on Figure 1-67.
- Change both the minimum and maximum values for cobalt from 3.7 J to 3.7, based on sample MW-8S on Figure 1-67.
- Change iron from 12,800 J to 12,800, based on sample MW-5S on Figure 1-67.
- Change arsenic from 7.5 to 7.5 J, based on sample G102L on Figure 1-67.

➔ Comment 232. Table 1-32. Under Area A, change arsenic from ND to 3 J, chromium from 4 to 4 J, cobalt from 6.3 J to 6.3, magnesium from 2 to 5, and manganese from 2 to 5, based on samples on Figure 1-72. Under Background, change iron from 3,840 to 2,060 for Sample G101D, based on Figure 1-72. Under Background-G101D, change 92,400 to 60,100, 92.3 to 39.7, 4,300 to 3,640 J, and 80,000 to 10,400 based on Figure 1-72. Under Background-MW7D, change 2,060 to 3,840, 60,100 to 92,400, 39.7 to 92.3, 3,650 J to 4,300 and 10,400 to 80,000, based on Figure 1-72.

➔ Comment 233. Table 1-33. The J qualifier should be defined in the key. Under Area B-Total Samples, determine whether the “0” shown for silver and nickel should be a “2”.

➔ Comment 234. Table 1-34. Under Area A, change carbon tetrachloride from 3 J to ND and 1 to 0, based on samples on Figure 1-69. It appears that 3 J was obtained from sample G101D, a background sample location. Under Background, change 1,1,1-trichloroethane minimum and maximum values from 3 J to 2 J, based on sample G101D on Figure 1-69.

Under Background, toluene is blank. Insert, from left to right, ND, ND, 0, and 4, based on background sample G101D on Figure 1-69. Under Background, explain why Total Samples are listed as 2 for volatile compounds. It appears that semivolatile sample data during Round 1 were rejected, not the volatile data. Explain. It seems that instead of 2 it should be 4 for all the volatiles, according to Figure 1-69. Under Background, change carbon tetrachloride from ND to 3 J and 0 to 1, based on sample G101D from Figure 1-69.

➔ Comment 235. Table 1-37. Explain why the values for total hazard indices presented in Table 1-37 for current resident-drainage ditch, current resident-Des Plaines River, current trespasser, and current adjacent resident exposure scenarios do not agree with those presented in the Final Baseline Risk Assessment. The total hazard indices presented

in the Final Baseline Risk Assessment for these scenarios are: 8.6×10^{-4} , 6.5×10^{-4} , 2.4×10^{-3} and 2.4×10^{-1} , respectively.

* Comment 236. Table 2-1. Under the heading "RCRA", the maximum concentrations of contaminants for the TCLP test under 35 IAC 721.124 (Subtitle G) and the constituent concentrations for wastes prohibited from land disposal under 35 IAC 728 (Subtitle G, Table A) are listed. However, the table does not indicate what these values will be used for, e.g., clean-up standards, screening levels, so it cannot be determined whether the values will be used correctly. These are appropriate citations for determining hazardous waste toxicity concentration and land disposal restriction requirements. Please indicate if these are the intended purposes of listing these values.

Based on the May 1994 *Drinking Water Regulations and Health Advisories* by the USEPA Office of Water, change the following maximum contaminant levels presented in Table 2-1: butyl benzyl phthalate (to 100), chloroform (to 100), copper (to TT**), lead (from 50 to TT**), and silver (from 50 to no MCL established). Based on the May 1994 *Drinking Water Regulations and Health Advisories* by the USEPA Office of Water, change the following maximum contaminant level goals presented in Table 2-1: butyl benzyl phthalate (to 0), chloroform (to 0), and cyanide (to 200).

Based on the *Docket Report on Health-Based Levels and Solubilities Used in the Evaluation of Delisting Petitions, Submitted Under 40 CFR 260.20 and 260.22*, July 1992, change the health based level (HBL) in Table 2-1 for zinc (from 10 to 7). The text does not mention the that following chemical-specific ARARs are presented in Table 2-1: (1) Clean Water Act/Human Health, "Water and Fish" and "Fish" and (2) HBLs. Revise the table so the cis- and trans- isomers of 1,2-dichloroethene can be compared to appropriate Illinois Groundwater Standards and HBLs with the information presented in Table 2-1. Include the Illinois Groundwater Objectives (35 IAC Part 620 Subpart F) in Table 2-1. Revise the Illinois Groundwater Standards for Aroclor (total) from 5 to 0.5.

Explain why no PAHs are presented in Table 2-1. Both PCB Spill Cleanup Policy levels should be noted as chemical-specific ARARs. The Clean Water Act/Human Health, "Water and Fish" and "Fish" values are in units of weight (i.e., micrograms and nanograms). These values represent the mass of a chemical that can be safely ingested in water and should not be compared to groundwater contaminant concentrations. Check the reference for "Note K". Should it say "PCB Spill Cleanup Policy, 40 CFR 761.120-761.135"?

Comment 237. Tables 2-1, 2-5, and 2-19 (ARAR tables). Attachment A to these comments contains ARARs that should be added to Tables 2-1, 2-5, or 2-19.

* Comment 239. Table 2-6, Remedial Action Objectives. As indicated in General Comment #28, Table 2-6 needs to be revised.

* Comment 241. Table 2-13. Some of the figures presented in this table seem to be inconsistent with figures in the report. Under "LNAPL-contaminated soil and bedrock", volumes of 4700 cy and 3800 cy are listed for Area 1:Unconsolidated Soil and Area 1:Bedrock, respectively. However, on page 2-14, these volumes are given as 4800 cy and 8400 cy. Note (5) mentions a volume of 7400 cy, which is listed as 6300 cy on page 2-14.

* Comment 242. Table 2-14. This table needs to be revised to list all constituents in groundwater that exceed MCLs, Illinois Class I Groundwater Standards, or other chemical-specific ARARs that are referred to by the title of the table.

* Comment 244. Table 2-16. Provide the equation used to calculate the "Calculated Ground Water Concentrations." Explain what the list of organic and inorganic parameters shown in the table represent. Explain why only this subset of TCL and TAL constituents was included in this table.

* Comment 246. Table 2-19.

- ▶ Page 1 of 8. Explain how Citation 40 CFR 264.228(a)(ii) which refers to closure of surface impoundments applies to this site.
- ▶ Page 4 of 8. Change the second citation to read: "35 IAC 307.1101-1103". Illinois pretreatment regulations are found in 35 IAC 310. Provide a more detailed citation than "local POTW regulations" if available.
- ▶ Page 5 of 8. It appears that "264" should be inserted between "40 CFR" and "Disposal and Closure Requirements". Please check. Special waste regulations are found in 35 IAC 810, not 35 IAC 724, 728 as presented in the table.
- ▶ Page 6 of 8. For the action "Disposal of Liquid-Containing PCBs", include Citation 40 CFR 761.60.

Specific Comments--Figures

* Comment 251. Figure 1-5. Wetlands mapped adjacent to the site are not legible. Small wetland areas described in Section 1.2.1 as adjacent to the site are not discernible on Figure 1-5. Revise.

* Comment 252. Figure 1-6. Please show the location of the community well for the Spring Acres Subdivision.

* Comment 255. Figures 1-14 and 1-17. Explain why "deep wells" G102D and G104D are omitted. The location of G102D is shown on Figure 1-15, but no piezometric surface elevation is shown. -

➡ Comment 260. Figure 1-23. The figure shows groundwater elevations for P23, P24, P25, and P26 but they are not shown on Table 1-6. Explain.

- ➡ Comment 261. Figure 1-24. This figure shows groundwater elevations for P23, P24, P25, and P26 but they are not shown on Table 1-6. Explain.
- ➡ Comment 262. Figure 1-25. The elevations on this figure (see Table 1-6 under "9/9/94-Corrected Piezometric Surface") are not corrected. Clarify. Explain what "(2)" next to P06 represents.
- ➡ Comment 263. Figure 1-26. The elevations on this figure (see Table 1-6 under "9/16/94-Corrected Piezometric Surface") are not corrected. Explain.
- ➡ Comment 264. Figure 1-27. The elevations on this figure (see Table 1-6 under "9/23/94-Corrected Piezometric Surface") are not corrected. Explain.
- ➡ Comment 265. Figure 1-28. The elevations on this figure (see Table 1-6 under "9/30/94-Corrected Piezometric Surface") are not corrected. Clarify.
- ➡ Comment 266. Figure 1-29. The elevations on this figure (see Table 1-6 under "10/7/94-Corrected Piezometric Surface") are not corrected. Explain.
- ➡ Comment 267. Figure 1-30. The elevations on this figure (see Table 1-6 under "10/25/94-Corrected Piezometric Surface") are not corrected. Clarify.
- ➡ Comment 268. Figure 1-31. The elevations on this figure (see Table 1-6 under "11/1/94-Corrected Piezometric Surface") are not corrected. Explain.
- ➡ Comment 269. Figure 1-32. The figure shows G106L with an elevation of 592.17 and on Table 1-6 it is 593.17. Clarify. The elevations on this figure (see Table 1-6 under "11/8/94-Corrected Piezometric Surface") are not corrected. Explain.
- ➡ Comment 272. Figure 1-39. Sample SB06 (0-5') is on this figure, but it is not mentioned in the text or tables. Explain.
- ➡ Comment 273. Figure 1-40. Sample location SB12 (2.5-5') should read SB12A (2.5-5'). Correct. Sample location SB13 (0-2.7') reads SB13 (0-1.7) on Table 1-10. Clarify. The definition of B may be incorrect. (See comment on Tables 1-22 and 1-24).
- ➡ Comment 275. Figure 1-42. Describe why background samples SB213AS through SB215AS, in which beryllium and cobalt were detected, were not listed on Table 1-13. The definition of B may be incorrect. (See comment on Tables 1-22 and 1-24).

➡ Comment 276. Figure 1-43. Sample SB205BS showed detects of beryllium and thallium. Describe why they were not listed on Table 1-13. The definition of B may be incorrect. (See comment on Tables 1-22 and 1-24).

* Comment 278. Figures 1-47 through 1-50 and Figures 1-55 through 1-60. The "Area of Excavation" on these figures differ from Figures 1-33 through 1-46 and Figures 1-56 through 1-59. Clarify.

➡ Comment 285. Figure 1-60. The figure shows only two samples with detections, but Table 1-28 shows "5" under Inorganics for "Number of Samples Collected." Figure 1-60 and/or text should show the other sample locations did not have detections.

* Comment 287. Figures 2-5 and 2-6 (USEPA Comment 19, FS Revision 0). It cannot be conclusively determined at this time whether the inorganic or organic contaminant plume has reached the Des Plaines River or not. Indicate the uncertainty of the southern boundary of the groundwater contaminant plume on Figures 2-5 and 2-6 by using dashed instead of solid lines. It may also be helpful to include four additional figures showing approximate extent of the organic and inorganic plumes separately for both the shallow and deeper portions of the aquifer.

ATTACHMENT A

Tables 2-1, **Potential Chemical-Specific Requirements**, 2-5, **Potential Location-Specific Requirements**, and 2-19, **Potential Action-Specific Requirements**, should be updated to include the following potential State and Federal ARARs. If the State regulations listed below are equally stringent or less stringent than the matching Federal regulations, the State regulations may be included within the table as "Notes" (i.e. A, B, C, etc.). In most cases, with the exception of for example 35 IAC 808 and 809, the State regulations are the same or less stringent.

Applicability	General Description	Citation
VOC emissions during remedial activities	Ambient air quality requirements; air monitoring and reporting requirements	Clean Air Act (42 U.S.C. 7401-7642)
Water quality	General use water quality standards	35 IAC 302-303
	National secondary drinking water standards	40 CFR 143
Direct discharge of treatment system effluent	Monitoring and reporting requirements	35 IAC 304, 306, and 307
	NPDES criteria or standards	40 CFR 125 (Sect. 301-317)
	Effluent limitations and reporting requirements for discharges into navigable water	35 IAC 309.101 - 309.191
	Toxic effluent standards	40 CFR 129
On-site construction/excavation	Construction in floodways and/or floodway fringes	92 IAC 708.70(d)
	Construction of RCRA landfill in floodplain	35 IAC 703.184
	Wetlands mitigation	33 CFR 320-330
	Construction requirements	35 IAC 309.201-282
	Endangered Species Act	50 CFR 200 and 402
	Industry safety and health standards	29 CFR 1910 and 1926
Various remedies	Regulates noise levels of certain activities	35 IAC 902

Applicability	General Description	Citation
Treatment	Storage in piles or tanks triggers storage requirements	40 CFR 264 (Subpart J)
	Visible emissions, fugitive dust emissions, and VOC emissions	35 IAC 212
	Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50 35 IAC 245
	Sources may be required to monitor air in site vicinity	35 IAC 201
	Emission standards for hazardous air pollutants	40 CFR Part 61 and 35 IAC 231
	New facilities shall not interfere with attainment of NAAQS	40 CFR 50 40 CFR 60
	Hazardous waste regulations under RCRA (may be applicable to spent carbon)	40 CFR 261 and 262
Land disposal	Disposal of special waste off-site	35 IAC 808, 809
	Disposal of special wastes on-site	35 IAC 811
Excavation	Control activity to minimize dust emissions	40 CFR 51
	Licensing and inspection for transport of special waste	35 IAC 722, 723, and 724

Applicability	General Description	Citation
Discharge to POTW	Recommendations for sewer works	35 IAC 370
	Pretreatment standards and monitoring and reporting requirements for discharge of contaminants to POTWs	40 CFR 403 35 IAC 310.201-233., 310.400-444, and 310.601-635
	National Categorical Pretreatment Standards	40 CFR 405-471
	Construction permitting for sewer line	35 IAC 309.202
	Operation of treatment works must be under supervision of certified operator	35 IAC 312.101
	Transport of wastewater to POTW; special waste stream authorization	35 IAC 721, 808, and/or 809
Consolidation	Consolidation in storage piles will trigger storage requirements	40 CFR 264, Subparts J and L
	Control activity to minimize dust emissions	40 CFR 51

ATTACHMENT B

United States
Environmental Protection
Agency

Office of
Solid Waste and
Emergency Response

Publication 9234 2-22FS
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ARARs Fact Sheet

Compliance with the Clean Air Act and Associated Air Quality Requirements

Office of Emergency and Remedial Response
Hazardous Site Control Division 5203G

Quick Reference Fact Sheet

Section 121(d) of CERCLA, as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA), requires that on-site remedial actions must attain or waive Federal and more stringent State applicable or relevant and appropriate requirements (ARARs) for environmental protection and facility siting, upon completion of the remedial action. The revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires compliance with ARARs during remedial actions as well as at completion, and compels attainment of ARARs during removal actions to the extent practicable, considering the exigencies of the situation. (See 40 CFR Parts 300.415(i) and 300.435(b)(2) and 55 FR 8666 to 8865, March 8, 1990.)

To implement the ARARs provisions, EPA has developed guidance, *CERCLA Compliance With Other Laws Manual: Parts I and II* (EPA Publications EPA/540/G-89/006 and EPA/540/G-89/009), and has provided training to Regions and States on the identification of and compliance with ARARs. This ARARs Fact Sheet is one of the numerous guidance documents that address questions that arose in developing ARARs policies, in ARARs training sessions, and in identifying and complying with ARARs at specific sites. (See *Compendium of CERCLA ARARs Fact Sheets and Directives* [EPA Publication 9347.3-15] and, in particular, *Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites* [OSWER Directive 9355.0-28]).

This Fact Sheet provides updated guidance on compliance with the Clean Air Act, as amended November 1990 (42 U.S.C. 7401 et. seq.) and related air quality rules under other environmental statutes. It addresses statutory and regulatory changes that have occurred subsequent to the publication of the above-cited Compliance Manual. It also includes a chart that summarizes which air quality requirements may be potential ARARs for CERCLA response actions or cleanup technologies (see *Attachment 1* on pages 23 and 24). In addition, there are Air/Superfund Coordinators in each EPA regional office who can provide further assistance concerning these requirements (see *Highlight 1*).

I. AIR QUALITY AT CERCLA SITES

CERCLA sites are potential sources of air pollutant emissions that can affect public health or welfare, and the natural environment. These air pollutant emissions may be present before and/or during the response action (i.e., the removal or remedial action), or during the operation and maintenance of the response action. Dozens of air pollutants have been documented at CERCLA sites. They include volatile and semi-volatile organics, particulate matter, heavy metals, and acids. The National Technical Guidance (NTG) developed by the Air/Superfund Coordination process has focussed its concern for the air pathway on those contaminants that are ozone precursors and/or hazardous air pollutants. Specific information about ozone precursors and hazardous air pollutants appears below in Sections VI and VIII of this Fact Sheet.

HIGHLIGHT 1 Air/Superfund Coordinators

OAQPS	(FTS/919) 541-5569
OERR	(FTS/703) 603-9035
REGION 1	(FTS/617) 565-3280
REGION 2	(FTS/212) 264-9868
REGION 3	(FTS/215) 597-9134
REGION 4	(FTS/404) 347-2864
REGION 5	(FTS/312) 886-9401
REGION 6	(FTS/214) 655-7223
REGION 7	(FTS/913) 551-7603
REGION 8	(FTS/303) 293-0969
REGION 9	(FTS/415) 744-1086
REGION 10	(FTS/206) 553-4198

The specific combination of contaminants at a particular CERCLA site depends upon the uncontrolled sources at the site, the selected treatment technology, and the residual materials at the completion of the response action. Landfills, lagoons, contaminated soil, and leaking drums are examples of uncontrolled sources of airborne contaminants at unremediated CERCLA sites. Equipment used during the cleanup process (i.e., remedial investigation, removal action, or construction of a selected remedy) may emit air pollutants. Examples of such equipment are soil handling operations, air strippers, on-site incinerators and solidification/stabilization processes. Residual emissions may continue after the selected remedy is constructed.

The Clean Air Act (CAA) is the primary Federal legislation for protecting air quality. EPA also promulgates air pollutant emission regulations for solid and hazardous waste management units under the Resource Conservation and Recovery Act (RCRA), and States often establish additional or more stringent standards. Substantive standards established by any of these regulations may be potential ARARs for CERCLA sites.

In order to identify whether CAA requirements are potential ARARs and then to determine whether they are either "applicable" or "relevant and appropriate," CERCLA site decisionmakers may need to know the following:

- ① Air quality designation of the site's location (i.e., attainment, nonattainment, unclassified, or transport) for each National Ambient Air Quality Standard (NAAQS). This information is published periodically in the *Federal Register* and also may be obtained from the Air/Superfund Coordinator in each Region.
- ② Classification of each designated nonattainment area (i.e., marginal, moderate, etc.). This information is published in the *Federal Register* and also may be obtained from the Air/Superfund Coordinator in each Region.

- ③ Required control measures including emissions limitations and emissions offsets. Under the NCP, the State is responsible for identifying its potential ARARs, including those that address air pollutant emissions. The Air/Superfund Coordinator in the Regional Office can be of assistance.
- ④ Baseline emission estimates at the site and estimated (i.e., modelled) air pollutant emissions associated with site investigation activities, construction of the remedy, and subsequent operation and maintenance of the remedy. The Air/Superfund Coordination program has developed the technical guidance to assist CERCLA site decisionmakers conducting air pathway analyses. Further information about the guidance can be obtained from the Air/Superfund Coordinator, who also can arrange for assistance in modelling emissions from proposed remedies. Superfund Regional Toxics Integration Coordinators will help in assessing the risk associated with those estimated emissions.

These points are discussed in greater detail in the remaining sections of this Fact Sheet.

II. OVERVIEW OF THE CLEAN AIR ACT

The CAA was derived from the Air Pollution Research and Technical Assistance Act of 1955 (Public Law 84-159). The CAA was first enacted in 1963 and was subsequently amended in 1965, 1967, 1970, 1977, and most recently in 1990. The 1990 amendments to the CAA contain the major titles shown in *Highlight 2*. This Fact Sheet will explicitly refer to the 1990 amendments when they have substantially altered the requirements of the CAA with respect to actions under CERCLA.

One purpose of the CAA is "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." The CAA provides the statutory framework within which EPA, the States, and localities will jointly attain this objective. It gives to EPA the task of establishing national standards for ambient air quality. The States are then obligated to implement, maintain, and enforce these standards.

Under Section 108 of the CAA, EPA has published a list of air pollutants whose emissions cause or contribute to air pollution that may reasonably be anticipated to endanger the public health or welfare. EPA is required to publish and periodically revise air quality criteria documents reflecting the latest scientific knowledge on the effects of these pollutants on public health and welfare. The term "criteria pollutants" is derived from these documents. Section 109 directs EPA to publish National Ambient Air Quality Standards (NAAQSs) for the criteria pollutants. These standards are discussed further in Section IV of this Fact Sheet.

The primary mechanism for attaining the NAAQSs is the State Implementation Plan (SIP), which each State must develop, adopt, and submit to EPA for approval under Section 110 of the CAA. The SIP must contain air pollutant emission standards, timetables for compliance with such standards, and any other measures necessary to attain and maintain the NAAQSs. Emission standards, which concern the amounts of air pollutants emitted by pollution sources, differ from ambient air quality standards, which concern the quality of the atmosphere external to buildings to which the public has access.

HIGHLIGHT 2
Major Titles of the Clean Air Act Amendments of 1990

- TITLE I** Addresses new requirements for areas that have not attained National Ambient Air Quality Standards.
- TITLE II** Covers mobile sources such as automobiles, trucks, and aircraft.
- TITLE III** Addresses hazardous air pollutants, maximum achievable control technology (MACT) regulations, solid waste combustion, residual risks, accidental releases, and other issues.
- TITLE IV** Addresses acid deposition control and electric utility emissions of sulfur dioxide and oxides of nitrogen.
- TITLE V** Covers operating permits for stationary sources and establishing an operating permit program.
- TITLE VI** Addresses stratospheric ozone by phasing out ozone-depleting substances.

In general, a State can select any combination of emission standards and compliance timetables for existing air pollution sources as long as it can demonstrate that this combination would result in attainment of the NAAQSs. However, Sections 111 and 112 of the CAA specify that EPA (rather than the States) must establish two classes of national emission standards. The first class is New Source Performance Standards (NSPSs), which are emission standards for new and modified stationary sources categorized by EPA as contributing significantly to air pollution. The second class is National Emission Standards for Hazardous Air Pollutants (NESHAPs), which regulate air pollutants to which no ambient air quality standard is applicable and which may contribute to increases in mortality or in serious or incapacitating illness. These two classes of emission standards are discussed in Sections V and VIII of this Fact Sheet.

III. REGULATED SOURCES

The CAA governs air pollutant emissions from both mobile and stationary sources. The CAA provisions governing stationary sources have greater importance for CERCLA sites. The term "stationary source" means any building, structure, facility, or installation that emits or may emit any air pollutant. This term may mean a single point releasing pollutants into the atmosphere. It may also mean all of the pollutant-emitting activities that belong to the same industrial grouping, if they are located on one or more contiguous or adjacent properties, and if they are under the control of the same person.

Many of the statute's provisions apply only to "major" stationary sources. The emissions threshold for designating a major stationary source varies depending on the air pollutant, the source type, and the surrounding air quality level relative to the applicable NAAQS. It may range from 10 to 250 tons per year. Sections IV through VIII of this Fact Sheet provide additional information on these emissions thresholds.

The term "new source" means any stationary source, the construction or modification of which is commenced after the publication of regulations (or proposed regulations) prescribing a standard of performance that will be applicable to such a source. A "modification" consists of any change to an existing source that would result in emissions of a regulated pollutant above *de minimis* amounts. Other sources are "existing sources." A CERCLA site could be an existing source for the purpose of developing site-specific baseline emission estimates, which are defined by the NTG as "emission estimates from disturbed and undisturbed sites and are necessary for evaluating a no-action alternative and for evaluating potential emissions during" the response action (See Volume I - Application of Air Pathway Analysis for Superfund Activities (EPA publication EPA-450/1-89-001, July 1989), pp. 5-12). If it would create potential air quality impacts (e.g., soil washing, thermal treatment, air stripping), the response action could itself qualify as a new source.

In general, the requirements for new sources differ from those for existing sources. New sources are governed by State regulations that are derived from NSPSs. Existing sources are governed by State regulations that are derived from SIPs. Additionally, new and existing sources are treated differently in regulations for NAAQS nonattainment areas and for Prevention of Significant Deterioration in attainment areas (see Sections VI and VII of this Fact Sheet).

IV. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQSs)

For each criteria pollutant, EPA must establish primary and secondary NAAQSs. These NAAQSs specify the maximum concentration of the pollutant which is to be permitted in the ambient air, as averaged over a specified time period. One of the major objectives of the CAA is the attainment of primary NAAQSs as expeditiously as practicable, but no later than a statutory deadline. The deadline varies with the pollutant involved, the severity of the nonattainment, and the availability and feasibility of pollution control measures. For pollutants other than ozone, the deadline ranges from 5 to 10 years after an area has been designated as being in nonattainment. For ozone, the deadline ranges from 1993 to 2010. (See Sections 172 and 181 of the CAA). Secondary NAAQSs are to be attained as expeditiously as practicable, but no deadline is specified in the CAA.

Primary standards are designed to protect the public health with an adequate margin of safety. The standards are set at levels that will protect both the healthy population and sensitive populations, such as individuals with pre-existing health conditions that may be complicated by excessive pollution. Under the statute, EPA may not consider technological feasibility and cost of compliance in setting primary NAAQSs.

Secondary standards protect the public welfare from any known or anticipated adverse effects of a pollutant. They are designed to protect against not only adverse effects on soil, water, crops, vegetation, animals, property, and visibility, but also any impacts on personal comfort and well-being. Secondary NAAQSs are the same as or more stringent than primary standards.

To date, EPA has established NAAQSs for six criteria pollutants (see 40 CFR Part 50), which are summarized in *Highlight 3*. EPA reviews NAAQSs at 5-year intervals and decides whether to update them. At present, EPA plans to propose more stringent NAAQSs for lead. Although NAAQSs form the basis for all regulations promulgated under the CAA, they are not enforceable in and of themselves. Rather, it is the emission standards, which are promulgated to attain the NAAQSs, that are directly enforceable and are potential ARARs.

Although NAAQSs are never ARARs, they may be used as other criteria or guidelines to be considered (TBCs) on an appropriate basis. This could include instances in which a SIP does not address an emission that is determined to be a health threat. As with all TBCs, the usage of NAAQSs must be justified on the basis that the public health or the environment needs to be protected.

Under Section 110 of the CAA, each State has primary responsibility for assuring air quality within its geographic area. Through a State Implementation Plan, the State establishes a program for regulating stationary and mobile sources that will achieve and maintain the NAAQSs. SIPs include emissions standards, monitoring, recordkeeping, enforcement, and other measures (e.g., economic incentives). The emissions standards and monitoring requirements are substantive requirements and are potential ARARs. The recordkeeping, enforcement and other measures are administrative requirements and are not potential ARARs. In developing its SIP, each State determines what categories of sources are responsible for nonattainment of NAAQSs. It then determines how much the emissions must be reduced by these source categories in order to attain the NAAQSs. The combination of emission standards and other measures that the State establishes to control a specific

HIGHLIGHT 3 Summary of NAAQSs

CRITERIA POLLUTANT	PRIMARY STANDARDS	SECONDARY STANDARDS	AVERAGING TIME
Carbon Monoxide	9 ppm	None	8-hour ^a
	35 ppm	None	1-hour
Lead	1.5 g/m ³	Same	Quarterly
Nitrogen dioxide	0.53 ppm	Same	Annual (Arithmetic mean)
Particulate Matter (PM ₁₀) ^b	50 g/m ³	Same	Annual (Arithmetic mean) ^c
	150 g/m ³	Same	24-hour ^d
Ozone	0.12 ppm	Same	1-hour ^e
Sulfur Dioxide	0.03 ppm	None	Annual (Arithmetic mean)
	0.14 ppm	None	24-hour ^a
	None	0.5 ppm	3-hour ^a

^a Not to be exceeded more than once in any consecutive 8-hour period per year.

^b PM₁₀ is the designation for particulate matter in the atmosphere that has an aerodynamic diameter of 10 μm or less.

^c The standard is attained where the expected annual arithmetic mean concentration, as determined in accordance with Appendix K (see 52 FR 24667, July 1, 1987), is less than or equal to 50 g/m³.

^d The standard is attained when a 24-hour average concentration above 150 g/m³ occurs no more than one day per calendar year.

^e The standard is attained when a maximum hourly average concentration above 0.12 ppm occurs no more than one day per calendar year.

(Source: 40 CFR Part 50 and *Guidelines for the Interpretation of Air Quality Standards*, OAQPS No.1.2-008, Rev. 1977)

pollutant is called a control strategy.

States have discretion in determining the combination of emission controls for all sources necessary to meet the NAAQS for each criteria pollutant. In general, however,

standards set for stationary and mobile sources must be at least as stringent as any EPA has promulgated. With certain exceptions, State standards may be more stringent and may cover additional source categories.

The State must submit the SIP to EPA for review and approval. Any substantive requirements embodied in a SIP, including locally promulgated ordinances that the State has incorporated into the SIP, are Federally enforceable and are thus potential ARARs. In some circumstances, if the SIP is inadequate or if the State fails to submit one, EPA must promulgate a Federal Implementation Plan (FIP), which is Federally enforceable.

The requirements for new sources of air pollutant emissions differ from the requirements for existing sources. Also, sources in areas that have not attained NAAQSs are subject to different standards than sources in attainment areas. Moreover, a CERCLA site may be in an area which has attained one NAAQS and which has not attained another NAAQS. Therefore, a source at some CERCLA sites, may have to meet both nonattainment and attainment provisions of the CAA. More information on this issue appears below in Sections VI and VII.

V. NEW SOURCE PERFORMANCE STANDARDS (NSPSs)

NSPSs are nationally uniform emission standards for major new stationary sources, particularly for industrial source categories (see Section 111 of the CAA). EPA's goal in promulgating these standards is to ensure that new sources and major modifications to existing sources are designed, built, equipped, operated, and maintained in a way that permits emissions to be controlled in a manner that considers both the best demonstrated technology (BDT) and economic feasibility. Because these standards are uniform across the Nation, they prevent new sources from being located selectively in areas with less stringent air pollution control regulations.

Section 111 of the CAA requires that EPA publish and periodically revise a list of categories of major stationary sources that cause, or contribute significantly to, air pollution that may be reasonably anticipated to endanger public health or welfare. These categories are listed at 40 CFR, Part 60. The CAA further requires that EPA promulgate NSPSs for these categories by a statutory deadline that the 1990 amendments extended to November 1996.

The process of promulgating NSPSs sometimes results in the indirect designation of particular air pollutants for control under these standards. Four air pollutants have been designated under NSPSs in addition to air pollutants for which air quality criteria documents have been issued. The four "designated pollutants" are fluorides, sulfuric acid mist, total reduced sulfur, and municipal waste combustor (MWC) emissions. MWC emissions are a composite pollutant, comprised of organics, acid gases, and metals. Section 111(d) of the CAA requires that EPA promulgate emissions guidelines for existing sources of designated pollutants. The States must establish standards of performance based on these guidelines.

The NSPSs are based on BDT, which is the "degree of emission reduction achievable through the application of the best system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environment impact and energy requirements) the Administrator determines has

been adequately demonstrated for that category of sources" (see Section 111 of the CAA). EPA may define BDT as an emissions limit or rate (i.e., a specified number of pounds per hour) or, where the setting of a limit is not feasible, as a design, equipment, work practice, or operational standard that reflects the "best technological system of continuous emission reduction."

To date, EPA has promulgated NSPSs for over 50 categories of sources, as shown in *Highlight 4*. At present, the NSPS source categories coincide with only a few of the air pollutant emission sources typically found at CERCLA sites. Thus, the NSPSs are not usually considered "applicable" to CERCLA activities. However, they may be "relevant and appropriate" if the pollutant emitted and the technology employed during the cleanup action are sufficiently similar to the pollutant and source category regulated by an NSPS that they are well-suited to the circumstances of the release at the CERCLA site. This is a site-specific determination based on the eight factors in the NCP (see 40 CFR Part 300.400 (g)(2)).

EPA has proposed a NSPS for air pollutant emissions from new municipal solid waste (MSW) landfills (see 56 FR 24468 to 24528, May 30, 1991). A MSW landfill is defined as an entire disposal facility in a contiguous geographical space where household waste is placed on or in land. A MSW landfill may receive other types of waste as well. The proposed Subpart WWW to 40 CFR Part 60 would establish a performance standard for nonmethane organic compounds (NMOCs) emissions from MSW landfill gases. A control device would then be used to reduce the NMOCs in the collected gas by 98 weight percent. For CERCLA municipal landfill remediations, these requirements would be potential ARARs for Records of Decision (RODs) signed after the rule's promulgation. Until these requirements are promulgated, they are TBCs.

A NSPS for particulate matter emissions from municipal incinerators has existed since 1971. However, the 1990 amendments to the CAA require EPA to establish additional performance standards for new and existing solid waste incinerator units (see Section 129 of the CAA). Such units include MWCs, medical waste incinerators, infectious waste incinerators, and industrial waste incinerators. The CAA specifies that numerical emission limitations be promulgated for particulate matter, opacity, sulfur dioxide, hydrogen chloride, nitrogen oxides, carbon monoxide, lead, cadmium, mercury, and dioxins and dibenzofurans.

Under Subpart Ea of 40 CFR Part 60, EPA promulgated performance standards for emissions from new MWC plants with capacities greater than 250 tons per day of municipal solid waste or refuse-derived fuel. The regulated pollutants are nitrogen oxides and MWC emissions. **The latter is a composite pollutant consisting of condensible metals associated with particulate matter, organics (i.e., dioxins and furans), and acid gases (i.e., sulfur dioxide and hydrogen chloride).** Carbon monoxide emission limitations are specified as part of "good combustion practice" requirements.

Similar emission guidelines for existing MWC plants with capacities greater than 250 tons per day of municipal solid waste or refuse-derived fuel were promulgated under Subpart Ca of 40 CFR Part 60. States are required to develop emission standards based on these guidelines. These emission standards may be less strict than the NSPSs, but they cannot be less stringent than the average emission limitations achieved by the best-performing 12 percent of existing MWC plants.

HIGHLIGHT 4

Source Categories for which NSPSs Have Been Promulgated*

Fossil-Fuel Fired Steam Generators (D)	Triple Superphosphate Plants (W)	Bulk Gasoline Terminals (XX)
Industrial-Commercial-Institutional Steam Generating (Da)	Granular Triple Superphosphate Storage (X)	Residential Wood Heaters (AAA)
Electric Utility Steam Generating (Db)	Coal Preparation Plants (Y)	Rubber Tire Manufacturing (BBB)
Incinerators (E)	Ferroalloy Production (Z)	VOC Emissions from Polymer and Resin Manufacturing (DDD)
Municipal Waste Combustors (Ca, Ea)	Steel Electric Arc Furnaces (AA)	Flexible Vinyl and Urethane Coating and Printing (FFF)
Portland Cement Plants (F)	Kraft Pulp Mills (BB)	Equipment Leaks of VOC in Petroleum Refineries (GGG)
Nitric Acid Plants (G)	Glass Manufacturing (CC)	Synthetic Fiber Production (HHH)
Sulfuric Acid Plants (H)	Grain Elevators (DD)	VOC Emissions from Synthetic Organic Chemical Manufacturing Industry Air Oxidation Process Units (III)
Asphalt Concrete Plants (I)	Surface Coating of Metal Furniture (EE)	Petroleum Dry Cleaners (JJJ)
Petroleum Refineries (J)	Stationary Gas Turbines (GG)	Equipment Leaks of VOC from Onshore Natural Gas Processing (KKK)
Petroleum Storage Vessels (K)	Lime Manufacturing (HH)	SO ₂ Emissions from Onshore Natural Gas Processing (LLL)
Secondary Lead Smelters (L)	Lead Acid Battery Manufacturing (KK)	VOC Emissions from Synthetic Organic Chemical Manufacturing Industry Distillation Operations (NNN)
Secondary Brass and Bronze Production Plants (M)	Metallic Mineral Processing (LL)	Nonmetallic Mineral Processing (OOO)
Primary Emissions from Basic Oxygen Process Furnaces (N)	Auto/Light-Duty Truck Coating (MM)	Wool Fiberglass Insulation Manufacturing (PPP)
Secondary Emissions from Basic Oxygen Process Steelmaking (Na)	Phosphate Rock Plants (NN)	VOC Emissions from Petroleum Refinery Wastewater Systems (QQQ)
Sewage Treatment Plants (O)	Ammonium Sulfate Manufacture (PP)	Magnetic Tape Coating (SSS)
Primary Copper Smelters (P)	Publication Rotogravure Printing (QQ)	Industrial Surface Coating: Plastic Parts for Business Machines (TTT)
Primary Zinc Smelter (Q)	Pressure Sensitive Tape and Label Surface Coating (RR)	Polymetric Coating (VVV)
Primary Lead Smelters (R)	Industrial Surface Coating: Large Appliances (SS)	
Primary Aluminum Reduction (S)	Metal Coil Surface Coating (TT)	
Wet Process Phosphoric Acid (T)	Asphalt Processing and Roofing Manufacturing (UU)	
Superphosphoric Acid (U)	Fugitive VOC Emissions in Synthetic Organic Chemicals Manufacturing (VV)	
Diammonium Phosphate Plants (V)	Beverage Can Surface Coating (WW)	

* The letters in parentheses following each source category are the applicable subparts of 40 CFR Part 60 containing the NSPS.

(Source: 40 CFR Part 60)

EPA plans to propose performance standards for MWC emissions from MWC plants with capacities equal to or less than 250 tons per year of pollutants. It also plans to propose performance standards for cadmium, lead, and mercury emissions for new MWC plants that emit more than 250 tons per year of pollutants.

VI. REQUIREMENTS FOR NONATTAINMENT AREAS

The 1970 CAA amendments made no provision for allowing new source construction in areas that had not attained NAAQSs. EPA developed an "emissions offset" policy to permit such industrial growth in such areas while making reasonable further progress toward attainment. Congress subsequently added this policy to the CAA (see Sections 171 through 178 of the CAA). When applying for permission to construct a new source in a nonattainment area, an applicant must enter into enforceable State agreements with owners or operators of existing sources to ensure that there is a net decrease in emissions in the area. Under these agreements, existing sources must reduce their emissions above and beyond that which would otherwise be required for them to offset the anticipated new emissions from the proposed new source. The sources would thus demonstrate progress toward attainment of NAAQSs. Major new sources in nonattainment areas have to meet the following requirements under the emissions offset policy:

- ① **New source review/preconstruction permit**, for construction or modification of any major source.
- ② **Air quality impact analysis**, to demonstrate that the proposed new source or modification would not cause or contribute to a projected degradation in pre-existing air quality beyond the allowance permitted by the nonattainment portion of the SIP.
- ③ **Emission offsets**, to obtain emission reductions from existing sources in an amount greater than the estimated new emissions.
- ④ **Lowest achievable emission rate (LAER)**, a technology-based standard that is either (a) the most stringent emissions limitation contained in any SIP for that category of source, or (b) the most stringent emissions limitation which is achieved in practice for that category of source. It cannot be less stringent than any applicable NSPS. LAER is set on a case-by-case basis during the preconstruction permit review. EPA's Office of Air Quality Planning and Standards (OAQPS) maintains a clearinghouse which contains information on pollution control technology. Air/Superfund Coordinators in each Region can provide assistance in utilizing the clearinghouse.

In 1990, ninety-six cities and other areas continued to have ozone levels that at times exceed the NAAQSs. Forty-one areas had carbon monoxide levels that exceed the NAAQSs. Based on limited data, EPA has estimated that about 70 areas have PM₁₀ levels that do not meet the NAAQSs. This failure to attain NAAQSs prompted stringent new nonattainment requirements in the 1990 amendments (see Sections 181 through 185 of the CAA).

Prior to 1990, any stationary source with a potential to emit 100 tons per year or more of any regulated pollutant was considered to be a major source. Under the 1990 CAA

amendments, the emissions threshold for determining a major source in nonattainment areas was changed for certain cases. As discussed below, the threshold for certain emissions now varies according to the severity of the nonattainment. Additionally, the amendments tightened emission offsets according to the severity of the nonattainment.

The cornerstone of the nonattainment requirements is a classification system for designating major sources, which must meet LAER. In general, the emissions threshold for a major source may be 100 tons per year for areas that have not attained the NAAQS. The emissions threshold may be lower for volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) in areas that have not attained the ozone NAAQS. The threshold varies with the severity of the nonattainment. As the severity of nonattainment increases, smaller and smaller sources become subject to regulation, and new sources must meet more stringent offset requirements (see *Highlight 5*, showing emissions thresholds and offset ratios for VOCs and NO_x). States may set even more stringent emissions thresholds and offset ratios than those in the CAA.

HIGHLIGHT 5
Emission Thresholds and Offset Ratios for Nonattainment Areas

CLASSIFICATION OF NONATTAINMENT AREA	EMISSIONS THRESHOLD (tons per year)	VOC AND NO _x OFFSET RATIO*
Marginal	100	1.1 to 1
Moderate	100	1.15 to 1
Serious	50	1.2 to 1
Severe	25	1.3 to 1
Extreme	10	1.5 to 1

* The ratio of total emissions reductions to total increased emissions.

(Source: 40 CFR 52.21(b)(4))

The 1990 CAA amendments also changed the emissions threshold for determining a major source of carbon monoxide or PM₁₀ in nonattainment areas. The carbon monoxide threshold is 50 tons per year for areas with "serious, severe, or extreme" nonattainment classifications. The PM₁₀ threshold is 70 tons per year for areas with "serious, severe, or extreme" nonattainment classifications (see Sections 186 through 190 of the CAA).

In general, States establish emission standards for existing sources in the process of preparing their SIPs. Under the 1990 amendments, EPA is requiring more stringent emission standards in areas with "moderate" or more serious ozone nonattainment classifications (see Section 182 of the CAA). The following requirement now applies for existing sources in such areas:

- ① Reasonably available control technology (RACT) for existing sources are set by States based on EPA-issued Control Technique Guidelines (CTG). RACT is defined as devices, system process modifications, or other apparatus or techniques that are reasonably available taking into account (1) the necessity of imposing such controls in order to attain the NAAQSs, (2) the social, economic, and environmental impact of such controls, and (3) alternative means of providing for attainment. The CTGs are guidelines and the States have final determination responsibility. For source categories that have no CTG, the States must determine RACT on a case-by-case basis or by source category. EPA already has published 28 CTGs and is required to publish over one dozen more by November 1993. Information on RACT is available from OAQPS' pollution control technology clearinghouse with the assistance of the Air/Superfund Coordinators in each Region.

The 1990 amendments introduced the concept of "ozone transport region," which is a region in which ozone nonattainment may result not only from local sources of emissions, but also from the long-distance transport of ozone precursors (i.e., VOC and NO_x) from distant sources. The amendments establish a transport corridor of 11 States in the Northeast (i.e., CT, DE, MA, ME, MD, NH, NJ, NY, PA, RI, VT), the District of Columbia, and Northern Virginia. EPA has the authority to designate additional transport areas but has not done so yet. When VOC sources located in these transport areas have emissions in excess of 50 tons per year, they must meet the control requirements described above for major VOC sources in moderate ozone nonattainment areas. (See Section 184 of the CAA.)

The implications of nonattainment provisions for CERCLA sites are complicated. First, the lead agency must determine whether the site, or specific activities at the site, qualify as existing or new sources under the CAA. For new sources, the next determination is whether or not the source qualifies as a major source. Since all major new sources must meet LAER, LAER will be "applicable" for any CERCLA site which meets the CAA definitions of major and new. Even if the site is not a major source, LAER may be "relevant and appropriate." In cases where the site, or specific activities at the site, meet the definition of an existing source, RACT (as embodied in State regulations) may also constitute an ARAR. CERCLA response actions are not subject to administrative procedures and permit requirements. They will have to comply with any substantive standards associated with the nonattainment regulations.

VII. PREVENTION OF SIGNIFICANT DETERIORATION

Sections 160 through 169A of the CAA establish the Prevention of Significant Deterioration (PSD) program to ensure that the air quality will not deteriorate significantly in areas that have attained the NAAQS. Regulation of the construction of new sources and major modifications is the primary control strategy. The PSD program allows some margin for future industrial growth in attainment areas, while preventing significant deterioration. PSD requirements will be "applicable" to a CERCLA action when such action is a major source or modification for any criteria pollutant and the source is located within (or possibly upwind of) an attainment area.

The CAA establishes three classes of PSD areas. Each class is allowed a specific increment of deterioration (i.e., the maximum allowable increase in air pollutant concentrations in the area.) Increments are calculated in relation to the "baseline concentration," which generally equals the air pollutant concentration existing on the date of the first major source PSD permit application. Class I increments are designed to protect pristine areas such as National Parks. Class II increments allow some limited industrial growth. Class III increments allow more intensive growth.

The cornerstone of the PSD program is a preconstruction or new source review of "major emitting facilities." In areas that have attained the NAAQS, the emissions threshold for designating a major emitting facility is 100 tons per year for 28 specified industrial categories (e.g., municipal incinerators and chemical processing plants)(see Section 169 of the CAA). The threshold is 250 tons per year for other industrial categories. State SIPs may have lower thresholds for applying PSD requirements. Substantive PSD requirements will be "applicable" if the response activity at a CERCLA site is a major source of emissions, considering the aggregate of all source emissions at the site. If the emissions threshold is not exceeded, the PSD requirements may be considered to determine if they are "relevant and appropriate," rather than "applicable." Administrative and permitting requirements can never be ARARs. Fugitive emissions (i.e., emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening) count towards the facility's potential to emit. The calculation of the potential to emit takes into account the effective operation of emission controls to the extent that they are Federally enforceable (see 40 CFR Part 52.21(b)(4)).

New sources in attainment areas must comply with the following requirements:

- ① **Best available control technology (BACT)**, established for each pollutant from each source. BACT means an emission limitation based on the maximum degree of reduction of each regulated pollutant. The permitting authority determines, on a case-by-case basis, what is achievable through application of production processes and available methods, systems, and techniques. The authority must take into account energy, environmental, and economic impacts and other costs. BACT must be at least as stringent as NSPSs. (See Section 165 of the CAA and 40 CFR Part 52.) Information about BACT is available from OAQPS' pollution control technology clearinghouse.
- ② **Continuous air quality monitoring** for each regulated pollutant and meteorological monitoring and modeling to show that the source cannot cause or

contribute to violations of the NAAQS or exceedances of the PSD increments for sulfur dioxide, nitrogen dioxides, and particulates (see 40 CFR Part 52.21(c)).

- ③ The ban on impairment of visibility or adverse impacts on soils or vegetation, or air quality-related values of certain wilderness areas and national parks.

In general, PSD requirements for major new sources in an attainment area will constitute potential ARARs for response actions (e.g., incineration, air stripping, soil vapor extraction) that could affect air quality at CERCLA sites. When deemed to be ARARs, PSD requirements should be addressed in the investigation, planning, and design decision documents (including the scope of work for investigation, Records of Decision, and Action Memoranda).

VIII. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Prior to the 1990 amendments, Section 112 of the CAA required EPA to set nationally uniform National Emission Standards for Hazardous Air Pollutants (NESHAPs). These standards addressed both new and existing sources, and were oriented toward particular hazardous pollutants at their point of emission from specific sources (e.g., inorganic arsenic emissions from glass manufacturing plants). A hazardous air pollutant (HAP) under the old statute is an air pollutant for which no NAAQS exists and which causes or contributes to air pollution that may reasonably be anticipated to result in an increase in mortality or serious illness. EPA designated eight pollutants as hazardous (see *Highlight 6*) and issued standards for all except coke oven emissions (which have been addressed specifically by the 1990 amendments). The Agency also listed 25 other pollutants, which it preliminarily assessed as HAPs.

EPA was required by a court decision to first determine the maximum amount of a HAP beyond which adverse health effects may take place and was then required to set an ample margin of safety below that level to protect the public health. Once the safe level was set, EPA could then consider costs and technical feasibility in establishing the NESHAPs. Design, work practice, equipment, or operational standards were substitutes for emission standards when the latter were not feasible to prescribe or enforce. Regulations for HAPs are found in 40 CFR Part 61. Previously promulgated NESHAPs remain in effect unless and until superseded by new regulations.

The NESHAP for asbestos is an example of a potential ARAR. Emissions of asbestos fibers are regulated under Subpart M of 40 CFR Part 61. This regulation includes requirements for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations, for active waste disposal sites, and for waste disposal for demolition and renovation operations. It does not include requirements for inactive waste disposal sites for demolition and renovation operations. Therefore, the

HIGHLIGHT 6 Hazardous Air Pollutants Under Old CAA

- Asbestos
- Benzene
- Beryllium
- Coke oven emissions*
- Inorganic arsenic
- Mercury
- Radionuclides
- Vinyl chloride

* Listed but not yet regulated

NESHAP will not be "applicable" to the cleanup of an inactive waste disposal site unless it was owned or operated by an asbestos mill, manufacturer or fabricator, or contained waste from such sources. However, the regulation may be "relevant and appropriate" to the control of asbestos fiber emissions at an inactive waste disposal site for demolition and renovation operations because the situation may be sufficiently similar.

The 1990 amendments significantly revamp the Section 112 approach to NESHAPs (see Section 301 of the 1990 CAA amendments). Key provisions of the amendments, which may create new ARARs, are:

- ① **Redefinition HAPs** -- The 1990 amendments redefined HAPs as those listed specifically as such by the amendments or by subsequent rulemaking. These pollutants present, or may present, a threat of adverse human health effects or adverse environmental effects. The term "adverse environmental effect" means any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resource.
- ② **Statutory HAPs** -- The 1990 amendments replaced EPA's 8 designated HAPs and 25 preliminarily assessed HAPs with a list of 189 HAPs (see *Attachment 2* on pages 25 through 27). The amendments mandate that EPA regulate all new and existing major sources and certain area sources which emit or may emit any of the 189 HAPs. Many of these substances are commonly found at CERCLA sites. EPA must periodically review and revise the list of HAPs, and may accept petitions to add or delete substances. Thus, CERCLA site managers should keep abreast of regulatory developments. EPA's Regulatory Agenda, published semiannually in the *Federal Register*, provides information (including the key EPA staff person to contact), on recently completed rules as well as those under development. The Air/Superfund Coordinator in each Region also can provide assistance in obtaining information.
- ③ **Regulated source categories and subcategories** -- Prior to 1990, NESHAPs were not generally "applicable" to CERCLA response actions because CERCLA sites do not usually contain one of the specific source categories that were regulated. However, the 1990 amendments significantly increased the number of source categories which must control HAP emissions. As required by the 1990 amendments, EPA has published a list of the major and area source categories that emit or may emit any of the 189 HAPs (see 57 FR 31576 to 31592, July 16, 1992). The list contains 174 source categories within 16 industry groups. Additionally, the specific HAPs associated with each source category are listed. The waste treatment and disposal industry group is composed of hazardous waste incineration, municipal landfills, sewage sludge incineration, site remediation, solid waste treatment storage and disposal facilities (TSDFs), and publicly owned treatment works emissions. Thirty-eight HAPs are listed under the waste treatment and disposal industry group. New and existing major sources in these 174 source categories will have to adopt controls when promulgated as described below. A major source is a plant site that emits 10 tons or more per year of a single hazardous air pollutant or 25 tons or more per year of any combination of hazardous air pollutants, after all emissions controls on the site are taken into account (see Section 112(a)(1) of CAA). The 1990 CAA

amendments give discretionary authority to EPA to lower the emissions threshold for designating a major source. This EPA decision would be based on the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors. Smaller stationary sources of HAPs, whose emissions are less than the threshold, are called "area" sources. Some area sources are also regulated, as discussed below.

- ④ **Technology-based standards** – For all source categories that emit HAPs, EPA must develop Maximum Achievable Control Technology (MACT) standards. EPA must promulgate these emission standards for 40 source categories by November 1992 and must complete rulemaking for all source categories by November 2000 (see *Highlight 7*). MACT standards are applicable to both new and existing sources within a source category. In determining MACT standards, the Agency may consider cost, non-air quality health and environmental impacts, and energy requirements. However, MACT standards for new sources must not be less stringent than the emission control achieved in practice by the best controlled similar source. In general, MACT standards for existing sources must be as stringent as the average control efficiency of the best-controlled 12 percent of similar sources. EPA usually will promulgate numerical emission limitation (i.e., a certain number of pounds per hour), but may instead elect to establish a work practice. For area sources, EPA may substitute generally available control technology or management practices (GACT) in the place of MACT standards.

HIGHLIGHT 7 MACT Standards Rulemaking Schedule

EPA SOURCE CATEGORIES	DEADLINE AFTER ENACTMENT
At least 40 categories/subcategories	2 years (November 1992)
Coke oven batteries	December 1992
25 percent of listed categories/subcategories	4 years (November 1994)
50 percent of listed categories/subcategories	7 years (November 1997)
100 percent of listed categories/subcategories	10 years (November 2000)

(Source: Section 112(e) of CAA)

For many CERCLA sites with a source in a regulated category, the MACT standards will be potential ARARs. To determine whether the MACT standards actually are ARARs, EPA will determine whether the site does or will include any regulated source categories and whether those sources emit or have the potential to emit HAPs. At sites with regulated stationary sources, the next decision is whether the CERCLA source meets the CAA definition of a major source. If so,

the MACT standard may be "applicable." Even where the MACT standard is not "applicable," it still may be "relevant and appropriate."

Federal rulemaking for EPA's initial list of source categories for the statutory HAPs will take a decade to complete. During that time, EPA may add or delete HAPs and regulated source categories. Thus, site decisionmakers should review the status of air regulations prior to the completion of Records of Decision, Action Memoranda, or other remedial and removal investigation, planning, or design decision documents. As noted above, the Air/Superfund Coordinator in the cognizant Regional Office can provide advice and assistance. It is useful to note that States will adopt operating permit programs (see Section IX of this Fact Sheet) to implement and enforce MACT standards as well as other air regulations. Although the NCP exempts CERCLA sites from obtaining permits for on-site actions, all remedial actions as well as removal actions (to the extent practicable) must identify and comply with (or explicitly waive) the substantive provisions of the permit regulations, such as MACT standards, that are determined to be APARs.

- ⑤ **Health-based standards** -- Within 8 years after MACT standards are established (or 9 years for those established by November 1992), EPA must promulgate any necessary standards to protect against the remaining residual health or environmental risks associated with HAPs. These standards would be triggered if more than one MACT-regulated source in a category has an associated maximum individual cancer risk that exceeds 1 in one million (i.e., 10^{-6}). These residual risk standards would be based on existing CAA language that specifies that standards must achieve an "ample margin of safety." CERCLA site decisionmakers should note that the health-based standards will be consistent with the generally acceptable risk range of 10^{-4} to 10^{-6} , as discussed in the NCP (see 40 CFR Part 300.430(e)(2)(i)(A)(2) and 55 FR 8666 to 8865, March 8, 1990).
- ⑥ **Specific pollutants** -- EPA must regulate sources that account for at least 90 percent of the aggregate emissions of each of seven pollutants: alkylated lead compounds; polycyclic organic matter; hexachlorobenzene; mercury; polychlorinated biphenyls; 2,3,7,8-tetrachlorodibenzofuran; and, 2,3,7,8-tetrachlorodibenzo-p-dioxin. By November 1995, EPA must publish a list of the source categories and subcategories that are to be regulated by November 2000.
- ⑦ **Area source regulations** -- The 1990 amendments require EPA to list each category or subcategory of area sources which presents a threat of adverse effects to human health or the environment (by such sources individually or in the aggregate). EPA must regulate area sources that account for at least 90 percent of the area source emissions of the 30 HAPs posing the greatest threat to public health in the largest number of urban areas. By November 1995, EPA must list the area source categories and subcategories that are to be regulated by November 2000.

- ⑧ Radionuclide emissions -- EPA is not required to promulgate standards for radionuclide emissions from source categories licensed by the Nuclear Regulatory Commission (NRC) if EPA determines that the NRC regulatory program provides an ample margin of safety to protect public health. States may adopt or enforce standards that are more stringent.

IX. TITLE V OPERATING PERMITS

The 1990 amendments, for the first time, require every major source (and certain other sources) regulated under the CAA to obtain an operating permit. States will develop the permitting programs in accordance with guidance from EPA (see Sections 501 and 502 of the CAA). EPA must review, and either approve or disapprove, the States' programs. CERCLA on-site actions are not subject to the administrative procedures and permit requirements. They will have to comply with any substantive standards associated with the permit programs that are determined to be ARARs. Such standards will be carried out through the Record of Decision (ROD) for the site, rather than through a permit.

X. AIR EMISSION STANDARDS UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

Regulations under RCRA address air pollutant emissions from several activities that may occur at CERCLA sites (e.g., incineration and air stripping). These RCRA regulations may be potential ARARs.

Regulations for air pollutant emissions from hazardous waste incinerators are set forth in 40 CFR Part 264, Subpart O. Performance standards were promulgated for emissions of principal organic hazardous constituents (POHCs) in the waste feed, hydrogen chloride and particulate matter. EPA has proposed amendments to these regulations (see 55 FR 17862 to 17921, 27 April 1990). These proposed rules would establish a more stringent performance standard for hydrogen chloride. They would also establish performance standards for toxic metals and for products of incomplete combustion (PICs). As of the date of the publication of this Fact Sheet, the proposed rules have not been promulgated, and thus are not potential ARARs until they are promulgated. However, they may constitute guidance TBC, if justified, on the record on a site-specific basis.

OSWER Directive 9347.0-1 (*Interim RCRA/CERCLA Guidance on Non-Contiguous Sites and On-Site Management of Waste and Treatment Residue*) provides the following information about limitations on the construction of hazardous waste incinerators for on-site CERCLA use:

If an incinerator is to be constructed for on-site remedial action, there should be a clear intent to dismantle or remove the unit after the CERCLA action is completed. Dismantling or removal should be a part of the remedy presented in the ROD and funds should be included in the financial or contractual documents. Should there be plans to accept commercial waste at the facility after the CERCLA wastes have been treated or destroyed, it is EPA policy that a RCRA permit be obtained before the unit is constructed.

XII. ADDITIONAL MATERIAL ON THE CLEAN AIR ACT

The following is a partial list of additional material concerning the Clean Air Act and the 1990 amendments:

- ① The Clean Air Act Amendments of 1990: Summary Materials. U.S. EPA, November 15, 1990 (20 pages; includes glossary, one page title summaries, and legislative chronology. Available from U.S. EPA—Office of Air and Radiation, Mail Code ANR-443, 401 M. Street, S.W., Washington, DC. 20460, (202) 260-7400.
- ② Clean Air Act Amendments of 1990: Detailed Summary of Titles. U.S. EPA, November 30, 1990 (Approximately 150 pages; includes a detailed summary for each title). Available from U.S. EPA—Office of Air and Radiation).
- ③ CERCLA Compliance with Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements, U.S. EPA Publication No. EPA-540/G-89-009, 1989. Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA. 22161, (703) 487-4600.
- ④ Self-instructional Course on Air Pollution Control Orientation. (SI:422) Available from U.S. EPA—Air Pollution Training Institute, Environmental Research Center, Mail Code MD17, Research Triangle Park, NC. 27711, (919) 541-2497.

* * * * *

NOTICE: The policies set out in this Fact Sheet are not final Agency action but are intended solely as guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this Fact Sheet, or to act at variance with the guidance, based on an analysis of site-specific circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

ATTACHMENT 1
Air Quality Regulations That Are Potential ARARs for CERCLA Response Actions or Technologies

CERCLA Response Action or Technology	Fact Sheet Sections					
	Section IV NAAQS- Derived State Air Emissions Standards ^{a,b}	Section V New Source Performance Standards	Section VIII National Emissions Standards for Hazardous Air Pollutants ^c	Section IX Title V Operating Permits	Section X RCRA Standards	Section XI State Air Toxics Regulations ^b
A. Air Pollution and Gas Migration Control						
1. Capping				b,e		
2. Dust control	Probable			b,e	Yes	Probable
3. Vapor collection and treatment (air stripping, carbon adsorption, etc.)	Probable		TBD	d	Yes	Probable
B. Waste Treatment						
1. Municipal waste incinerators	Probable	Yes		b,e		
2. Hazardous waste incinerators			TBD	b,e	Yes	Probable
3. Other thermal treatment				b,e	Yes	Probable
4. Solidification/stabilization				b,e		
5. Biological treatment (activated sludge, etc.)	Probable	Yes		b,e		
6. Chemical treatment (neutralization, etc.)				b,e		
7. Physical treatment (carbon adsorption, etc.)	Probable			b,e	Yes	Probable
8. In situ treatment (soil vapor extraction, etc.)	Probable			b,e	Yes	Probable
C. Waste Management Units						
1. Tanks and containers			TBD	b,e	Yes	Probable
2. Waste piles				b,e	Yes	Probable
3. Municipal landfills (flaring, gas collection, etc.)	Probable	TBC ^d	TBD	b,e		
4. Hazardous waste landfills, (flaring, gas collection, etc.)			TBD	b,e	Yes	Probable
5. Surface impoundments			TBD	b,e	Yes	Probable
6. Land treatment				b,e	Yes	Probable
7. Injection				b,e		
8. Containment Buildings					Yes	Probable

(continued)

ATTACHMENT 1
Air Quality Regulations That Are Potential ARARs For CERCLA Response Actions or Technologies (continued)

CERCLA Response Action or Technology	Fact Sheet Sections					
	Section IV NAAQS- Derived State Air Emissions Standards ^{a,b}	Section V New Source Performance Standards	Section VIII National Emissions Standards for Hazardous Air Pollutants ^c	Section IX Title V Operating Permits	Section X RCRA Standards	Section XI State Air Toxics Regulations ^b
D. Soil and Sediment Containment and Removal						
1. Excavation				b,e		
2. Dredging				b,e		
3. Grading				b,e		
4. Capping				b,e		
5. Revegetation				b,e		
E. Surface Water Controls						
1. Capping				b,e		
2. Grading				b,e		
3. Revegetation				b,e		
4. Diversion and collection				b,e		
F. Leachate and Groundwater Controls						
1. Containment barriers (slurry walls, etc.)				b,e		
2. Groundwater pumping				b,e		
3. Subsurface collection drains				b,e		
4. Permeable treatment beds				b,e		
5. Capping				b,e		

^a NAAQSs cannot be ARARs. They are not enforceable in and of themselves.

^b For information about specific state regulations, consult the Air/Superfund coordinator in the appropriate EPA regional office.

^c To be determined. A source category list will be published by EPA.

^d To be considered. Regulations have been proposed (but not promulgated) for organic emissions from municipal solid waste landfills.

^e Regulations have been proposed (but not promulgated) for the operating permit program and, therefore, these standards are TBCs. States will develop permitting programs in accordance with the promulgated regulations. Substantive standards associated with this program may be ARARs, but administrative procedures and permit requirements are not potential ARARs.

ATTACHMENT 2

Hazardous Air Pollutants Listed in the 1990 amendments (see Section 112(b)(1))

CAS Number	Chemical Name*	CAS Number	Chemical Name
75070	Acetaldehyde	78591	Isophorone
60355	Acetamide	58899	Lindane (all isomers)
75058	Acetonitrile	108316	Maleic anhydride
98862	Acetophenone	67561	Methanol
53963	2-Acetylaminofluorene	72435	Methoxychlor
107028	Acrolein	74839	Methyl bromide (Bromomethane)
79061	Acrylamide	74873	Methyl chloride (Chloromethane)
79107	Acrylic acid	71556	Methyl chloroform (1,1,1-Trichloroethane)
107131	Acrylonitrile	78933	Methyl ethyl ketone (2-Butanone)
107051	Allyl chloride	60344	Methyl hydrazine
97671	4-Aminobiphenyl	74884	Methyl iodide (Iodomethane)
62533	Aniline	108101	Methyl isobutyl ketone (Hexone)
90040	Anisidine	624839	Methyl isocyanate
1332214	Asbestos	80626	Methyl methacrylate
71432	Benzene (including benzene from gasoline)	1634044	Methyl tert butyl ether
92875	Benzidine	101144	4,4-Methylene bis(2-chloroaniline)
98077	Benzotrichloride	75092	Methylene chloride (Dichloromethane)
100447	Benzyl chloride	101688	Methylene diphenyl diisocyanate (MDI)
92524	Biphenyl	101779	4,4'-Methylenedianiline
117817	Bis(2-ethylhexyl)phthalate (DEHP)	91203	Naphthalene
542881	Bis(chloromethyl)ether	98953	Nitrobenzene
75252	Bromoform	92933	4-Nitrobiphenyl
106990	1,3-Butadiene	100027	4-Nitrophenol
156627	Calcium cyanamide	79469	2-Nitropropane
105602	Caprolactam	684935	N-Nitroso-N-methylurea
133062	Captan	62759	N-Nitrosodimethylamine
63252	Carbaryl	59892	N-Nitrosomorpholine
75150	Carbon disulfide	56382	Parathion
56235	Carbon tetrachloride	82688	Pentachloronitrobenzene (Quintobenzene)
463581	Carbonyl sulfide	87865	Pentachlorophenol
120809	Catechol	108952	Phenol
133904	Chloramben	106503	p-Phenylenediamine
57749	Chlordane	75445	Phosgene
7782505	Chlorine	7803512	Phosphine
79118	Chloroacetic acid	7723140	Phosphorus
532274	2-Chloroacetophenone	85449	Phthalic anhydride
108907	Chlorobenzene	1336363	Polychlorinated biphenyls (Aroclors)
510156	Chlorobenzilate	1120714	1,3-Propane sultone
67663	Chloroform	57578	beta-Propiolactone
107302	Chloromethyl methyl ether	123386	Propionaldehyde

ATTACHMENT 2 **Hazardous Air Pollutants Listed in the 1990 amendments (see Section 112(b)(1))**

<u>CAS Number</u>	<u>Chemical Name*</u>	<u>CAS Number</u>	<u>Chemical Name</u>
126998	Chloroprene	114261	Propoxur (Baygon)
1319773	Cresols/Cresylic acid (isomers and mixture)	78875	Propylene dichloride (1,2-Dichloropropane)
95487	o-Cresol	75569	Propylene oxide
108394	m-Cresol	75558	1,2-Propylenimine (2-Methyl aziridine)
106445	p-Cresol	91225	Quinoline
98828	Cumene	106514	Quinone
94757	2,4-D,salts and esters	100425	Styrene
3547044	DDE	96093	Styrene oxide
334883	Diazomethane	1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin
132649	Dibenzofurans	79345	1,1,2,2-Tetrachloroethane
96128	1,2-Dibromo-3-chloropropane	127184	Tetrachloroethylene (Perchloroethylene)
84742	Dibutylphthalate	7550450	Titanium tetrachloride
106467	1,4-Dichlorobenzene(p)	108883	Toluene
91941	3,3-Dichlorobenzidine	95807	2,4-Toluene diamine
111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)	584849	2,4-Toluene diisocyanate
542756	1,3-Dichloropropene	95534	o-Toluidine
62737	Dichlorvos	8001352	Toxaphene (chlorinated camphene)
111422	Diethanolamine	120821	1,2,4-Trichlorobenzene
121697	N,N-Diethyl aniline (N,N-Dimethylaniline)	79005	1,1,2-Trichloroethane
64675	Diethyl sulfate	79016	Trichloroethylene
119904	3,3-Dimethoxybenzidine	95954	2,4,5-Trichlorophenol
60117	Dimethyl aminoazobenzene	88062	2,4,6-Trichlorophenol
119937	3,3'-Dimethyl benzidine	121448	Triethylamine
79447	Dimethyl carbamoyl chloride	1582098	Trifluralin
68122	Dimethyl formamide	540841	2,2,4-Trimethylpentane
57147	1,1-Dimethyl hydrazine	108054	Vinyl acetate
131113	Dimethyl phthalate	593602	Vinyl bromide
77781	Dimethyl sulfate	75014	Vinyl chloride
534521	4,6-Dinitro-o-cresol, and salts	75354	Vinylidene chloride (1,1-Dichloroethylene)
51285	2,4-Dinitrophenol	1330207	Xylenes (isomers and mixture)
121142	2,4-Dinitrotoluene	95476	o-Xylenes
123911	1,4-Dioxane (1,4-Diethyleneoxide)	108383	m-Xylenes
122667	1,2-Diphenylhydrazine	106423	p-Xylenes
106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	0	Antimony Compounds
106887	1,2-Epoxybutane	0	Arsenic Compounds (inorganic including arsine)
140885	Ethyl acrylate	0	Beryllium Compounds
100414	Ethyl benzene	0	Cadmium Compounds
51796	Ethyl carbamate (Urethane)	0	Chromium Compounds
75003	Ethyl chloride (Chloroethane)	0	Cobalt Compounds

(continued)

ATTACHMENT 2

Hazardous Air Pollutants Listed In the 1990 amendments (see Section 112(b)(1))

CAS Number	Chemical Name*	CAS Number	Chemical Name
106934	Ethyl dibromide (Dibromoethane)	0	Coke Oven Emissions
107062	Ethylene dichloride (1,2-Dichloroethane)	0	Cyanide Compounds ^b
107211	Ethylene glycol	0	Glycol ethers ^c
151564	Ethylene imine (Aziridine)	0	Lead Compounds
75218	Ethylene oxide	0	Manganese Compounds
96457	Ethylene thiourea	0	Mercury Compounds
75343	Ethylene dichloride (1,1-Dichloroethane)	0	Fine mineral fibers ^d
50000	Formaldehyde	0	Nickel Compounds
76448	Heptachlor	0	Polycyclic Organic Matter ^e
118741	Hexachlorobenzene	0	Radionuclides (including radon)/
87683	Hexachlorobutadiene	0	Selenium Compounds
77474	Hexachlorocyclopentadiene		
67721	Hexachloroethane		
822060	Hexamethylene-1,6-diisocyanate		
680319	Hexamethylphosphoramide		
110543	Hexane		
302012	Hydrazine		
7647010	Hydrochloric acid		
7664393	Hydrogen fluoride (Hydrofluoric acid)		
123319	Hydroquinone		

NOTE: For all listings above that contain the word "compounds," and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

*Chemical Abstracts Service registry number.

^bX'CN where X = H' or any other group where a formal dissociation may occur (for example, KCN or Ca(CN)₂).

^cIncludes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH₂CH₂)_n-OR' where n = 1, 2, or 3

R = alkyl or aryl groups

R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH₂CH₂)_n-OH. Polymers are excluded from the glycol category.

^dIncludes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral-derived fibers) having the average diameter of 1 micrometer or less.

^eIncludes organic compounds having more than one benzene ring and a boiling point equal to or greater than 100 degrees Celsius.

^fA type of atom which spontaneously undergoes radioactive decay.



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